INSEAD

Faculty & Research

Photocopiers and Water-coolers
The Affordances of Informal Interaction

by

Anne-Laure Fayard

and

John Weeks

2005/46/OB
(Revised Version of 2004/02/OB)

Working Paper Series

Photocopiers and Water-coolers

The Affordances of Informal Interaction

Anne-Laure Fayard and John Weeks

INSEAD
Boulevard de Constance
77305 Fontainebleau, France
+33 1 60 72 40 00

anne-laure.fayard@insead.edu
john.weeks@insead.edu

24 June 2005

This paper benefited from the helpful comments and advice of Michael Brimm, Catherine Cramton, Gerry DeSanctis, Charlie Galunic, Martin Gargiulo, Austin Henderson, Jean-Claude Thoenig, John Van Maanen, John R. Weeks, Sr. and anonymous reviewers from the Academy of Management. We would also like to thank the members of all of the organizations studied for their patience and forbearing letting us listen in on their informal interactions.

Photocopiers and Water-coolers

The Affordances of Informal Interaction

Abstract

It is a well-documented finding that the physical environment of an organizational setting can have a substantial impact on the patterns of informal interaction and communication that occur there. However, conflicting empirical results of previous studies, when taken together, show that there is no simple, deterministic relationship between physical characteristics of an environment—such as distance, open architecture, or the presence of shared resources—and patterns of informal interaction that occur in that environment. Physical characteristics matter, but social characteristics matter too. We argue that to understand the relationship between environments and informal interactions, i.e., the ecology of informal interactions, we need to take seriously the idea that the physical artifacts and the social constructions of organizations are mutually constitutive. The concept of *affordances*, drawn from ecological psychology, provides a means of considering how the physical and social characteristics of an environment jointly influence the perceptions and behaviors of actors. We develop a theory of the environmental affordances of informal interaction: proximity, privacy, and legitimacy. We illustrate and elaborate the theory using data from field studies conducted in and around photocopier rooms in three organizations.

Keywords: affordance, informal interactions, symbolic interactionism, proximity, privacy, legitimacy, space, ecology

It is a well-documented finding that the physical environment of an organizational setting can have a substantial impact on the patterns of informal interaction and communication that occur there (Baldassare 1978; Oldham, et al. 1995; Gieryn 2000). However, research on which physical elements of a given environment will be salient for informal interaction in a particular social setting, and what specific impact those elements will have on behavior, has thus far led only to fragmented and contradictory findings. Following Kornberger and Clegg (2004), we argue that these seeming contradictions can only be resolved by framing the research within a theoretical perspective that takes into account the social meaning of the physical environment and takes seriously the idea that the physical artifacts and social constructions of organizations are mutually constitutive. Our goal in this paper is to develop such a perspective and illuminate it with qualitative data from field studies conducted in and around photocopier rooms in three different organizational contexts.

Proximity

It is known that increasing the physical distance separating people at work is likely to decrease the amount of spontaneous, informal contact among them (Allen 1977; Keller, and Holland 1983; Davis 1984). This is illustrative of the more general principle known as the "First Law of Geography:" All things are related to one another, but near things are more related than distant ones (Tobler 2004). Allen (1977), found in an R&D organization that people were exponentially less likely to interact informally with people with desks further away from their own with an asymptotically low probability of interaction reached within 25 to 30 meters.

There is evidence that the effect of place and distance can be overcome, at least in part, by the deliberate structuring of formal, task-mandated communication within an organization (Sundstrom 1986). Thus, it is spontaneous and informal interaction that

seems most likely to be shaped by physical convenience (Kiesler, and Cummings 2002). In a large study of an insurance agency, Wells (1965) showed that friendships among employees decreased steadily as a function of the distance between their desks. Homans (1954), finding similar results among the female cash posters he studied—and finding proximity more significant than homophily as a predictor of the formation of cliques—argued that clerks "who sat near each other then had many chances to interact and tended to become friends." This is consistent with social psychological studies of propinquity which show that interaction may increase attraction—perhaps either because interactions increase familiarity among actors (Zajonc 1968) or because they increase the similarity of actors (Newcomb 1956).

The importance of these informal interactions extends beyond the friendship and satisfaction benefits derived by individual workers. Since Dalton (1959) first wrote about the importance of the "informal organization," there has been appreciation of the link between informal interactions and organizational outcomes. Allen (1977) concludes that the rate of innovation in R&D settings is directly related to the frequency of chance interactions among engineers. Kotter (1972) finds that general managers rely on spontaneous, unplanned interactions with others to get their job done. Pinto, Pinto and Prescott (1993) argue that proximity leads to greater cross-functional cooperation in project teams because of the informal interactions thus afforded. Studies of virtual teams show that an important disadvantage of distance for these teams is that the difficulty and relative absence of informal and spontaneous interactions negatively impacts the effectiveness of collaboration and, ultimately, performance (Kraut, et al. 2002). Companies such as Scandinavian Air Systems (SAS) (Marcus, and Cameron 2002), Corning (Leibson 1981) and Xerox (Horgen, et al. 1999) have redesigned their offices to maximize the opportunity for informal

interaction explicitly in the belief that this will improve performance. Meanwhile, Tom Peters (1992) exhorts his millions of corporate readers to recognize the importance of "the parameters of intermingling" for culture change, innovation, and learning in organizations.

There are more parameters associated with intermingling than just distance, however. Indeed, the literature suggests that the effects of metrical distance are significantly moderated by the physical layout of offices and workspaces in shaping informal interactions. Hall (1966) argues that the physical boundaries within a space should significantly affect the measurement and definition of proximity. If two people are in an open office, the distance between them can be measured directly: their desks may be two meters distant from one another. However, if their desks are in exactly the same places but are divided by a wall, the distance between the two people may be most usefully considered to be the length the two have to travel to get from one desk to another, which may be much greater than two meters as they have to walk around the wall.

The presence, absence, and facing of chairs, desks, walls, doors, partitions, windows, and stairs have all been found to be influential in this regard. In their study of the Westgate married-student housing complex at MIT, for example, Festinger, Schachter and Back (1950) found that people were more likely to interact with those who occupied apartments facing their own, and that people who had apartments near stairways, entries and mailboxes made more friends than did others. Pfeffer (1992) argues similarly that occupying an office across from the rest rooms offers enhanced opportunity for spontaneous interaction with others. This suggests a *convenience theory* of informal interaction which hypothesizes that people typically will not go out of their way for informal interactions but will engage in them only to the extent that it

is convenient. Proximity, as it relates to informal interaction, may be conceptualized as a measure of how much physical effort is required by two people to meet. Such a view is supported by Estabrook and Sommer's (1972) study of university professors showing that faculty members were less well acquainted with colleagues on different floors that with those from different departments located on the same floor. Sommer (1969) finds that even the facing of chairs shapes how much interaction there is among people in close proximity—even if people merely have to turn their heads to talk to one another informally, we find they are less likely to do so.

Privacy

Complicating a naive convenience theory are the results of the copious studies of the effects of walls and partitions on informal interaction and communication in office settings that have arisen in response to the Burolandschaft movement. Pioneered by the German Quickbourner Group in the 1960s, Burolandschaft ideas of open-plan offices, with minimal divisions, partitioned by low-height cubicles have become globally mainstream. The widespread adoption of such layouts has prompted studies of their behavioral impact (Zalesny, and Farace 1987). Oldham and Brass (1979) argue that if we combine the theory that people will engage in informal interaction when physical layout makes it convenient to do so with the idea that such interaction has positive outcomes for the individuals involved and the organization more generally—a combination they label the *social relations approach*—we are led to expect that removing walls and lowering partitions, and thus making people more accessible to each other, should increase the amount of informal interaction we observe. Empirical evidence for such a prediction is decidedly mixed, however. A number of studies have, indeed, found that informal interaction and ease of communication are greater in open-plan offices (Allen, and Gerstberger 1973; Ives,

and Ferdinands 1974; Szilagyi, and Holland 1980), though others have found no such correlation (Oldham, and Brass 1979; Sundstrom, et al. 1980). The opposite—that walls, partitions and other forms of inaccessibility and privacy may actually be positively associated with interaction activity—has also been found. Hatch's (1987) study of two San Francisco Bay Area high technology firms found this to be the case, and Oldham and Rotchford's (1983) comparative study of clerical workers in 19 offices found that people in open-plan, accessible, dense, and dark offices were more likely to leave the office during their breaks and at lunch than stay and interact informally with coworkers.

Oldham and Brass (1979) show that sociotechnical theory (Emery, and Trist 1972; Herbst 1974), with its emphasis on the ways in which physical enclosure may transform a work area into a private, defensible space, offers a powerful counterpoint to the social relations approach and can help make sense of the finding that walls and partitions can sometimes increase the amount of informal interaction that takes place. Enclosure affords the privacy necessary for certain types of discussion. Oldham and Brass (1979) found that, in the newspaper organization they studied, the move to an open-plan layout reduced the amount of feedback supervisors gave subordinates and perceived amount of friendship opportunities. It was impossible, respondents told them in interviews, to engage in a private conversation with superiors or coworkers or even to invite a few persons to a party because everyone would hear. Sundstrom, Herbert and Brown (1982a) similarly found that a reduction in workspace enclosure led to a decrease in reported satisfaction privacy and a corresponding decrease in confidentiality of conversation. Further, while it may be true—as the social relations approach emphasizes—that people who interact more come to like each other more, sociotechnical theory, with its normative emphasis on participative design, focuses

attention on studies showing that most people report a desire for more privacy, not less, in their workspace (Dean 1977; Sundstrom, et al. 1980; Brill 1984; Hatch 1991; Oldham, et al. 1991) and may employ the tactical use of posters, plants, filing cabinets, and other movable objects to achieve it, whatever the desires their leaders have to increase accessibility.

There is also evidence that unintended outcomes may attend the forcing of people to come into contact with one another either by removing walls or by creating centrally located "interaction-promoting facilities" (Allen 1977: 248) that contain shared resources that people must use during the day, such as rest rooms, coffee machines, laboratory equipment, copy machines, and cafeteria. Marcus and Cameron (2002: 59-61), for example, report the experience of SAS and the design of their headquarters building which opened in 1987 in Stockholm. The building was designed by architect Niels Torp with the assumption made explicit by SAS management that "good ideas spring from impromptu meetings" and that, therefore, the physical layout of the building should generate such good ideas which are "rarely created when you're sitting at your desk alone and tense, but during creative encounters with other human beings." Accordingly, the headquarters are laid out as a "street" that links shopping, eating, medical and sports facilities, as well as lecture theatres and art galleries, to create a "buzz of conversation" and prompt employees to "stop, talk, and think, for inspiration and relaxation." Additionally, private offices surround *multirooms*: interaction-promoting facilities that contain comfortable furniture for meetings, coffee machines, fax and photocopying machines, shared office supplies, computer terminals. The SAS building has received an enormous amount of praise and attention and, in the early 1990s, Torp was commissioned by British Airways to design their headquarters in Harmondsworth, near Heathrow,

along similar lines. But, as Marcus and Cameron (2002) note, studies of the interaction patterns in the SAS building run counter to the predictions of the company and its architect. According to Grajewski (1993), who studied interaction patterns in the building a few years after its opening, only 36% of interactions occurred in the spaces deliberately designed and labeled for it—9% in the "street," 13% in the multirooms, and the other 24% in traditional meetings rooms and corridors. The rest, 64%, occurred in private offices. "In other words, work patterns were very much what one would find in most conventional offices" (Marcus, and Cameron 2002: 60).

The Hawthorne Legacy

Such explicit attempts to manipulate the physical environment in order to produce desirable behaviors—and the often apparent perversity of their effects—are reminiscent of those most famous studies of the effects of the physical environment on organizational behavior: The Hawthorne Experiments (Roethlisberger, and Dickson 1939). As a field, we have learned much about the relationship between environment and behavior in the many decades since Hawthorne, though arguably we have learned less than we would have had those studies not effectively stigmatized such work by seeming to provide conclusive evidence that human relations factors dwarf physical factors in explanatory importance (Oldham, et al. 1995). The legacy of the Hawthorne Experiments has been painstakingly analyzed (Gillespie 1991), and the results themselves have long been a matter of lively controversy (Carey 1967; Shepard 1971; Franke, and Kaul 1978; Jones 1992). In retrospect, and in light of studies reviewed above showing that physical elements such as walls and shared facilities may increase, decrease, or have little direct effect on informal interactions, two implications of the Hawthorne Studies are worth restating. The first is that the physical environment of a workplace has an impact on the behavior observed within

it, but predicting which elements of the environment will prove significant and what impact they will have is complicated; the possibility of surprise and unintended consequence is high. As Steele (1973) and Hatch (1997) have pointed out, contrary to received wisdom, the Hawthorne Experiments do not provide evidence for the claim that the physical environment has little impact on behavior. What is true is that no correlation was found between the level of lighting, or other intended physical elements, and efficiency. However, Homans—a member of the Harvard-based research team studying the Hawthorne Plant—argues in *The Human Group* (1950) that the most significant physical effect of the Relay Assembly test was the relocation of the groups of workers under study from their normal environment into small, separate T Rooms for the studies.

Designed to isolate the test groups from the noise and light and other uncontrolled factors in the main relay assembly room, the T Rooms not only marked the special social status of the six women being observed and removed them from the supervision of the normally, bullying, foreman (Hatch 1997: 242), but it allowed the women to talk to one another about movies and clothes and boyfriends and so on to the extent that two of the six women were removed from the study and replaced after ignoring warnings from the experimenters to stop talking so much because it was believed the talking jeopardized the realism of the tests (Gillespie 1991: 61). Gillespie notes that the change in behavior was not viewed as an interesting finding because the researchers "concentrated on those factors that they had deliberately manipulated in the test room, with a view to intensifying managerial control" (ibid.: 67). What's more, the Hawthorne researchers focused on formal workplace behaviors, viewing informal interactions as an inefficiency that could promote error in the system. Even in the Bank Wiring Observations, where every effort was made to replicate the

normal industrial conditions in the test room and there was no significant change in output associated with the isolation of the workers under observation, Homans (1950: 54) notes that the test group was "a little more noisy and boisterous. They were in a room by themselves, and their regular supervisor, who had never incommoded them very much, could not remain in the room all the time."

This points to the second implication of the Hawthorne Studies for the present study: not only are the effects of the physical environment on informal interaction present and often unintended, they are also entwined and inseparable from social effects that accompany them (Kornberger, and Clegg 2004). The status afforded by the T Room is not independent of the physical characteristics of the room—its smallness and isolation—but the effects of those physical characteristics are mediated by socially constructed understandings of space, and hierarchy and privilege. The reduction in supervision in the test rooms is a social phenomenon but it is mediated by the physical constraints of the situation. Taken in all their original rich complexity, what the Hawthorne Studies show is that social and physical effects cannot be considered independently without producing confusion and seemingly contradictory results.

An Ecological Approach

The above discussion reveals that, as authors such as Zalesny and Farace (1987) and Hatch (1991) have indicated, there is a need to build on existing social relations and sociotechnical approaches to take into account the ways in which the meaning of physical characteristics are socially constructed and the ways in which social understanding and individual perceptions are shaped by the physical environment. Following Kornberger and Clegg (2004), we argue that it is the ability to conceptualize this mutual constitution of the physical and social that will characterize

a successful theory of the *ecology* of informal interaction, i.e.: the relationship between a particular environment and the behavior of actors within it.

Take proximity and privacy, the key characteristics typically employed to explain the effects of the physical environment on informal interactions. Both obviously have physical entailments, but neither is most useful conceived as a purely physical characteristic. Monge (1985) and others have argued about proximity that we must consider its social psychological dimension to understand its possible impact on informal interactions: "The opportunity and obligation for communication that people perceive by being physically close to others is often more important than the actual physical distance" (Monge, et al. 1985: 1129). This leads to a definition of organizational proximity as "two or more people being in the same location where there is both the opportunity and psychological obligation for face-to-face communication" (ibid.). Sykes, Larntz and Fox (1976), as well as Schutte and Light (1978), have pointed out that this assumption of a decrease in perceived distance being associated with an increase in the obligation to communicate, has always been implicit in proximity studies. But this obligation has social, not physical, origins and its contours are socially defined. Standing close to someone in an elevator, for example, may provoke some degree of interaction obligation while sitting the same distance across from someone at a lunch table may provoke much more. The context matters. Further, as Hall (1966) shows, there are national, regional, and ethnic differences in relationship between physical distance and interaction obligation. The culture matters.

Privacy, similarly, has both physical and social entailments. Privacy may be usefully defined as "selective control of access to the self or to one's group" (Altman 1975: 18). Control of access includes control of the transmission of information—

being overseen or overheard—as well as control over interruption, noise disturbance, and visual distraction by others. It means being able to control the boundaries of the conversation: temporal boundaries, when it starts and when it ends, as well as spatial boundaries, who hears and sees what. Such control is partially afforded by the visual and acoustic isolation of a physical environment (Sundstrom, et al. 1980). If we understand well a social setting, we may speak of one space as being more private than another: an office with walls and a door is more private than a desk in the middle of an open-plan office, for example. But we must keep in mind that how much privacy is afforded by a space depends also on social norms such as those concerning whether it is acceptable or not to shut your door or lock it, to wear headphones while working, to interrupt someone and under what conditions, matter considerably, and, importantly, on the activities that are socially designated for a particular space. That is, we need to explain the space as a place where certain things are expected to happen (Buttimer, and Seamon 1980; Gieryn 2000). The same small room, 5 meters square, fully enclosed, with a door kept closed may afford considerable privacy if it is a broom cupboard and considerably less if it is a smoking lounge.

The importance of social norms and social designations in constructing the meaning and the consequence of proximity and privacy suggest why purely psychological explanations, though interesting, are inadequate. For example, stimulus-screening ability and task engagement have been postulated as psychological mechanisms that could explain why proximity and privacy are associated with different reactions of different people (Mehrabian 1977). Some people are more distracted by visual and acoustical stimuli than others and low-screeners perceive proximity and privacy differently than do those with a higher ability to screen. Similarly, some tasks engage more attention than do others and the concentration they

afford creates a detachment effect making people less sensitive to external stimuli. Fried (1990), for example, found that the joint presence of few enclosures and high social density was associated with an intensification of work fatigue and psychosomatic complaints among people with a low screening ability. Oldham, Kulik, Stepina (1991) report that stimulus-screening skills and job complexity moderated the relationship between enclosure and social density and the outcomes of performance and satisfaction. Sutton and Rafaeli (1987) similarly found evidence that more complex jobs made people less sensitive to physical attributes of the workspace such as social density, control over privacy, lighting and heating. Olson et al. (2002), however, found evidence questioning the direction of causality: the setting itself may influence the screening-ability of the people working there. They studied the radical collocation of teams working close together in single team rooms and, comparing the results of surveys administered at the beginning and end of the six to eight week projects, found that team members reported being significantly less susceptible to distraction by the end.

Meanwhile, Sundstrom, Burt and Kamp (1980) found that job complexity had little effect on employee reactions to social density and workspace enclosure. Indeed, laboratory experiments by Block and Stokes (1989) revealed that for simple tasks the presence of others enhances the performance of individuals whereas people perform complex tasks when working alone in a room. Zajonc (1965) theorizes that there is a social facilitation effect whereby the presence of others increases the alertness, motivation, and speed of people doing simple tasks but distracts, reduces the accuracy, and increases the stress of people doing more complex tasks (Kiesler, and Cummings 2002). We find, in other words, that in some settings task complexity sensitizes people to social density and enclosure, in others it detaches them from these

effects, while in still others job complexity has no moderating effect whatever. This leaves us where we started: needing to theorize how the social setting and physical environment mutually constitute each other to affect behavior.

Symbolic Interactionism

A promising line of inquiry into how to explain differing behavior reactions to enclosed and open-plan offices has examined the symbolic meaning of the physical work environment. In particular, attention has been paid to the status associated with different forms of physical layout (Hatch 1991). Zalensy and Farace (1987) found, in a study of civil servants moving to a Burolandschaft-style office layout, that individuals with high status, as measured by their civil service classification, perceived less personal privacy in, and were less satisfied with, the new office arrangement than did lower-status individuals. Similarly, Sundstrom et al. (1982b) found that office managers, bookkeepers and secretaries perceived privacy differently. These studies are suggestive. As a way to operationalize symbolic meaning, status has the virtue of being convenient to measure quantitatively. As authors such as Kornberger and Clegg (2004) and Hatch (1997) argue, though, status is only one important element of the socially constructed symbolic meaning of the physical work environment. A integrative theory would need to consider other elements too, such as the activities defined to occur in a given place and the norms regarding the appropriate behavior in that place.

Symbolic interactionism (Blumer 1969) is well-suited for this integrative task. Described by Baldassare (1978: 45) as "an infrequently used but potentially important perspective on human spatial behavior," symbolic interactionism focuses attention on the roles and activities that are socially designated for a particular space (Goffman 1966; 1971). It forces us to consider the ways a physical environment, as Hillier

(1996: 190) puts it, "creates a pattern of normal expectation about people. These expectations guide our behavior. Where they are violated, we are uncomfortable and behave accordingly." More an approach or orientation than a specific theory, symbolic interactionism is associated, conceptually, with a concern for how meaning—the meaning of a setting or of a situation, for example—is socially constructed and negotiated and, methodologically, with field studies and participant-observation that allow the researcher to understand and describe the process of meaning-making. A social interactionist approach to the ecology of informal interactions strives for an understanding of how, in a given social setting, certain physical characteristics of an environment afford legitimacy to certain activities.

Consider, for example, the water-cooler—historically, or at least apocryphally, the organizational site *par excellence* of informal interactions. Stereotypically, the space around the water-cooler has a social significance that leads to its being a natural and comfortable place to gather informally. This significance is neither identical to, nor independent of, the physical water-cooler itself. People may hang around the water-cooler more to quench their thirst for gossip than for water, but remove the water-cooler and the interactions will migrate elsewhere. The water-cooler provides an excuse to stand around it; it affords legitimacy to informal interaction. In these days of bottled water and beverage diversity, many offices may not even have a physical water-cooler, and "water-cooler" has remained in popular usage as a figure of speech. The metaphorical "water-cooler" is more often now a coffee machine or photocopier.

Yet not every coffee machine is hung around and not every photocopier room is a hub of informal discussion. Why not? The theories of proximity, from the social relations approach, and privacy, from the sociotechnical approach, are clearly part of the reason. For informal interactions to occur at a given place, that place must afford

spontaneous proximity to a random selection of other people. Informal interactions are, by definition of "informal," somewhat unplanned, spontaneous, and accidental. They are also, by definition of "interaction," more than mere encounters or the mutual acknowledgment of visual sighting. In organizational settings, interactions tend to involve talk. For interaction to occur in a given environment, it must therefore afford sufficient privacy for people to be able to hear each other and control the social boundaries of their conversation. But an environment must afford more than merely proximity and privacy for informal interactions to occur there. If such interaction is not considered legitimate in a given place, few informal interactions will occur there. An environment must afford legitimacy for informal interaction. Proximity, privacy, and legitimacy are each constituted both physically and socially. Physical distance, layout, material form and function, and social meaning are brought together in our claim that three *affordances*, proximity, privacy, and legitimacy, must be present in sufficient degree for an environment to foster informal interaction.

Affordances

We use the term *affordance* advisedly here. The concept of affordance was first developed by the ecological psychologist James Gibson (1979) in a series of studies about visual perception. Based on extensive experimental work, Gibson argues that what an organism perceives immediately about its environment is information about the behavioral possibilities it affords. According to this approach, when we view a scene, what we apprehend is not just a pattern of abstract geometric shapes and shades of color but the potential the scene holds for sitting, climbing, hiding, falling off, moving through and so forth—its *affordances*. With conscious effort, we may perceive a scene photographically but, most of the time, as we are moving about and acting in the environment, Gibson claims, our visual system does not operate like a

motion picture camera projecting a movie on the back of the retina observed by some little homunculus in our brain (ibid.: 60). Perceiving is for doing: the evolutionary function of visual perception is to help the organism navigate and survive in its environment. Perception is economical. All it takes is symmetrical expansion of a darker-than-background area in our ambient optic array to make us flinch involuntarily to avoid anticipated collision from a looming object (Stafford, and Webb 2004). Normally, it is not necessary to distinguish all of the qualities of an object—its color, texture, composition, size, shape, mass, elasticity, rigidity and mobility—and, normally, what the object affords us is what we pay attention to (Gibson 1979: 135). Similarly, with other people, our perceptions of them arrive immediately with information about the opportunities they afford for acting, interacting, and being acted upon—physical threat, sexual availability, cooperation, communication, etc. (Zebrowitz 1997). Indeed, as Gibson (1979: 128) notes, "What other persons afford, comprises the whole realm of social significance for human beings. We pay the closest attention to the optical and acoustic information that specifies what the other person is, invites, threatens, and does."

The world around us, in this view, is always already imbued with meaning for the observer. We may be wrong about what an environment affords us, as when we misperceive a closed glass door as an open doorway and attempt to walk through it, but our perceptions are always laden with meaning. This meaning, the affordances of the environment, is of course relative. A small hole that affords concealment to a mouse does not afford the same thing, and will not be perceived in exactly the same way, to a human adult. Gibson explicitly rejects the absolute duality of subjective and objective and argues that considering affordances—which are real and external to the perceiver yet relative to the perceiver—allows us to escape this philosophical duality

(ibid.: 41). It is for this reason that the concept of affordances is so useful in the current context. It gives us a language for talking about the elements of meaning in an environment that we perceive as indicating the behaviors that are possible within it. It gives us a way to organize what we need to know to build a theory of the ecology of informal interactions: the characteristics an environment must posses to afford the necessary proximity, privacy, and legitimacy for people to perceive the possibility of interacting informally there.

Gibson's ecological approach to visual perception and the theory of affordances has been influential in perceptual psychology and cognitive science, but elements of the theory are controversial (Gardner 1987). Specifically, researchers such as Ullman (1980), argue against the strong form of Gibson's claim that affordances are perceived *directly*: i.e., without the need to invoke beliefs, attitudes, or mental processes. Gibson, these critics claim, neglects the information-processing problem of how, exactly, affordances are recognized as such. Others, such as Turvey and Shaw et al. (1981), have, in turn, defended direct perception on conceptual and empirical grounds. The debate over the amount of mental processing involved in the perception of affordances need not concern us here, however. Research suggests that, whatever stand one takes on the question of cognitive mechanisms, the concept of affordances can help clearly and concretely explain how physical attributes and social meaning, together, shape behavior and how, in turn, patterns of behavior shape the physical environment and its assigned meaning (Norman 1988; Gaver 1996; Hutchby 2001).

Methods

The question of how and why only some environments afford informal interactions will not be resolved with yet another quantitative study of the correlation between physical attributes and interaction behaviors. There is already sufficient

empirical evidence of excellent quality reviewed above. It is contradictory. What is needed, therefore, at this point is a richer understanding of the physical and social characteristics that may be associated with the affordances of proximity, privacy, and legitimacy that are needed for informal interaction. For this task, qualitative data are well-suited. Our aim is to use qualitative observations gathered in exploratory field studies of three organizational contexts to ground and enrich our ecological theory of informal interaction.

The data were gathered as part of a larger project by the first author. Patterns of social interaction in and around photocopier rooms were studied using direct observation and videotaping. Three different settings were studied, each a small department (10-20) people within a larger organization: the research center of a publicly-owned utility (see Figures 1 and 2), a commercial publishing house (see Figures 3 and 4), and a business school (see Figures 5 and 6). All three organizations are located in northern France. Each department was made up of a mix of professional and administrative staff. In each case, the photocopier was located in a special-purpose room that contained the photocopying machine itself as well as a fax machine and a shared printer. The photocopiers were *casually operated*: i.e., operating the copier was not the main role or job of the individuals who used it, and the copier was a means to accomplish other tasks, copying was not a primary task in itself. In none of the cases had the photocopier rooms been intentionally designed to facilitate or foster informal interactions.

Figures 1 – 6 about here

The data collection was not designed specifically with the objective of studying informal interactions. It began with a study at the first site about the impact of

technology on office work and organizational behavior. What emerged as a surprise from that study was the amount of time people spent in and around the photocopier room and the recognition that the task of photocopying, far from being a solitary or individualistic task, is often collaborative. Photocopiers, like videocassette recorders, are everyday technologies ostensibly made for use by non-specialists but often designed in a way that baffles casual users with complicated features and cryptic interfaces. Photocopiers also require periodic maintenance and resupply of paper and toner, tasks requiring knowledge (where are the paper and spare toner cartridges kept, e.g.) and skills (how is the paper loaded into the machine to prevent jams, how is the toner cartridge installed, e.g.) that tend to be unevenly distributed among users of the machine. Thus, we observed people turning to each other for help in operating the photocopier, watching each other to learn more about how to operate the machine, and commenting on its operation. What's more, they negotiated access to the machine and demonstrated sociability while waiting to use it. Had the photocopier machine been intentionally designed to afford social interaction rather than document duplication, it could hardly have succeeded better. Intrigued by these findings, the first author conducted additional first-hand and videotaped observations of photocopier rooms in the two subsequent sites focusing specifically on behaviors in and around photocopier rooms. The comparative observations enriched the emerging analysis, revealing similarities and striking differences among the three sites that helped distinguish between characteristics that may be essential in their affordance of informal interaction and those that are incidental.

In all, 38 hours of videotape was taken and an additional 25 hours of observation and discussion with informants conducted over a 24-month period. As we realized afterwards, photocopier rooms turn out to be advantageous locations for observation

by researchers for reasons that echo the reasons that photocopier rooms are such fostering environments for informal interactions: they afford the researcher proximity, privacy, and legitimacy. First, because copying was not a specialized task, at least in these three organizations, the photocopier room was regarded as accessible to people at all levels of the hierarchy: anyone may use the copier although people in some roles used it much more often than do others. Thus, the photocopier room provided a place from which to observe the interaction of a wide range of people. Second, while the photocopier room was a public space, it nevertheless offered a degree of privacy: it was sufficiently unobtrusive (unlike, for example, the middle of a corridor where an observer would be in the way) but was also sufficiently public (unlike, for example, a restroom where an observer would be intrusive). The researcher could come and go as necessary. The room was used throughout the day (unlike, for example, the office cafeteria) and required no coordination with others to begin and end specific periods of observation. Third, the photocopy machine itself offered a form of legitimacy for the research, a "cover story" (Van Maanen 1991: 35). Studying photocopying was seen as strange by many subjects but not intrusive or suspicious. This was important because the advantages of close observation over other methods—experimentation, for example—of studying the influence of environment on informal interaction is the ability to capture normal and natural patterns of interaction. This advantage would be compromised to the extent that people acted differently than normal because there was a researcher watching and videotaping them. Short of hiding the camera, there was no way completely around this. Reviewing the tapes, however, it is observable that people took less notice of the camera the longer it was there.

We analyzed the videotapes and fieldnotes to understand the specific ways in which each of the three sites fostered—or failed to foster—informal interactions.

Consistent with the advice of Strauss (1987) and Becker (1998), we used the literature and existing theory to help us focus our coding and analysis. Having recognized the theoretical importance of proximity, privacy, and legitimacy for informal interaction, we coded the data for these affordances. For the informal interactions we observed at each site, we noted the salient characteristics of the physical and social environment. In addition, we examined the instances of encounters between people that did not develop into interactions as well as the periods of time where no interactions occurred and noted the characteristics of the environment salient for these non-interactions. We derived three core categories that saturated these characteristics. These core categories are: location, layout, and material form and function. Location includes characteristics relating to the physical location of the photocopier room, both absolute location within the building and relative location in terms of how near or far it is from other organizational spaces such as offices, entrances, stairwells, lavatories, etc. Layout includes characteristics relating to the design of the room: how open or enclosed it is, how large or small, how many windows and doors, etc. Material form and function includes characteristics relating to the objects populating the room and their technical and social function, such as the photocopier itself, fax machine and printer, mailboxes, bulletin board, etc.

Results

The three contexts shared much in common and were superficially very similar. The technology—the photocopier itself—was nearly identical in the three cases. As our observations revealed, however, the three spaces were quite different in small but important ways—important in the differences we found in the patterns of informal interaction in each. Overall, there was a great deal of informal interaction conducted in two of the sites and almost none in the third.

We found that several different characteristics—either on their own or, more commonly, in combination—of the environment produce or retard the three focal affordances of proximity, privacy, and legitimacy. Some of these characteristics are physical, others are social, most are both social and physical at once. These characteristics can be organized under the categories of location, layout, and material form and function. In what follows, we describe the characteristics associated with each of the three affordances (see Table 1 for a summary). In so doing, we deepen our understanding of these affordances and specify how they may be physically and socially constituted.

Table 1 about here

Affording Proximity

A space affords proximity if it brings two or more people close enough together for them to have the opportunity and social obligation for face-to-face communication (Monge, et al. 1985: 1129). This communication may be nothing more than a smile, a nod of recognition, or a brief exchange of greetings and well-wishing. In such a case, we speak of two or more people *encountering* each other. They may, then, stop together and interact (or they may not). A space affords proximity if it creates *encounter-obligation* among two or more people, whether or not they proceed to interact. We are interested specifically in *chance encounters,* which are unplanned and spontaneous. Entropy is an important part of what makes interactions informal. We want to understand the characteristics of spaces that bring more or less random pairs, or groups, of people in proximity spontaneously.

Location, location, location. The old retailing slogan is at least a third right: location matters. The more traffic that passes through or past a space, the more that

space affords proximity. All else equal, spaces whose locations are out of the way and require a special trip to visit afford less opportunity of encountering others. In others words, proximity is enhanced by *central* location. But, as we observed, it is important to distinguish *physical* centrality from *functional* centrality. What mattered in the three sites we observed was not that the photocopier room was physically in the center of the office. More important was whether it was near a functional center of the office—near the entrance, lavatories, stairwell, or other place regularly visited by people throughout the day.

The first site studied (RC) was the research center of a large publicly-owned utility. At RC, the functional centrality of the photocopier room was high. Its door opened onto a hall leading to the main stairway entrance of the department. This hall also contained the elevator to the other floors of the department. Any person entering or leaving the department (only possible via the stairs or elevator) passed by the photocopier room. Thus, everyone walked past it at least twice a day and, in practice, people passed it several times a day. The same hall also contained the departmental mailboxes. Along the hall, near the photocopier room was the meeting room where people took coffee in the morning and after lunch. The photocopier room was located at the intersection of this hall and the corridor to all of the offices. Coming in an out of the photocopier room, a person was likely to encounter another member of the department and, standing in the photocopier room, it was likely that many people would pass by.

The second site (PH) was a department within a commercial publishing house. The location of the photocopier room at PH was physically central as well as functionally central. At PH there is a main entrance hall leading to two corridors which wrap around opposite sides of a central core and end at an open-plan office.

The photocopier is in the central core with a single door opening onto one of these corridors. The department's few traditional offices-with-doors also are accessed via this corridor. Also in the central core is a meeting room whose door opens onto the other corridor. This second corridor contains the kitchen, separated by no walls or doors where people can make some coffee. People usually don't stay there to drink their coffee. Most of the traffic flows through the corridor where the photocopier room is located.

The third site (BS) was an academic department of a business school. At BS, the photocopier room was not central. It was at the end of a corridor, beyond the secretaries' office, next to a staircase that served primarily only as a fire exit and was seldom used. Aside from people specifically arriving to use the photocopier and the occupants of the three offices facing the door to the photocopier room, there was little traffic.

Opportunity and obligation for encounter are influenced by the layout of a space: its shape and size, how enclosed it is, how many doors and windows it has. Visibility is an important element for encounter-opportunity. Visibility specifies whether, as people pass by a space, they can easily see inside who is there to join them, and, reciprocally, whether those inside can see who is passing by to call to them. The enclosure of a space and its ratio of walls to windows or doors or low-partitions determine the visibility it affords people inside and out. Accessibility, determined by the number of doors or open entrances, shapes whether people are likely to enter the space. All else equal, people are more likely to enter a space when it is easier to do so. Finally, the size of the space influences encounter-obligation. In very large spaces, people may be able to be in the room with others without acknowledging the fact, i.e., without encountering them. All three of the photocopier rooms were large

enough to admit several people comfortably but small enough to obligate people to encounter each other, at least given the French white-collar office-culture in which all three were set.

At RC, the photocopier room was completely enclosed along three walls and partially enclosed along the fourth wall containing its large doorway. The photocopier room had a window, which looked out of the building, making the room seem spacious. However, the layout of the hallway and door of the room was such that it was difficult to see who was in the room while walking down the hall, and it was noticeable that people had to purposefully peer in to see. Similarly, while making copies it was difficult to know that someone was passing by. In some cases, people relied on auditory cues. It was possible to hear footsteps or voices as people walked down the hall and if people in the photocopier room were talking this was audible from the hall, often prompting a passer-by to have a look in. From the photocopier, it was possible to hear people talking in the hall in front of the elevator and sometimes people making copies would hear a colleague and go to talk with them. Thus, encounters could be quite spontaneous, but the voice cues reduced the randomness of the mix of people encountering one another as there was conscious selection based on familiar voices.

The layout of the photocopier room at PH was minimally enclosed thanks to its open door and large interior window. People passing by along the corridor could see in to find out who was there making copies or getting their mail. The high visibility was reciprocal: those in the photocopier room could see out to identify people walking by in the corridor.

At BS, the degree enclosure of photocopier room was between that of RC and PH. Like RC, it had one door that is always open onto the corridor. Compared to RC,

though, anyone passing by could fairly easily see inside. The photocopier was positioned near the door and so someone operating it could see out and identify anyone passing. The room was interior and had no window. It was dark, making it feel small and cramped.

Material form and function codes the objects in the space and the associated function or functions of the space. The most obvious of these, in the current case, is the photocopier itself. The presence of the photocopier, and the function it provided of duplicating documents—and, in some cases, printing and faxing documents—drew people to the room and brought them in proximity to others to the extent that they did their own photocopying, printing or faxing. Although in all three sites, the room was known locally as "the photocopier room," or "the copier," each room sheltered several other resources as well, providing additional opportunities for people to encounter each other there.

At RC, the photocopier machine also served as the department's printer and fax machine. In the room were also a shared color printer, which was for special jobs only and seldom used, and a supply cabinet. On the wall were two bulletin boards where company information, such as details of the summer camp for the children of the company, and personal information, such as announcement of births, were posted. In RC, everyone did their own copying. This had not always been the case, but recently management had decided to flatten the organization by downsizing secretarial and administrative support such that only the top management had secretarial support. The two secretaries in the department, therefore, were no longer supposed to provide any secretarial support to the 20 researchers. The researchers copied documents in order to support the administrative activity of their bureaucratic public organization, to share drafts of documents that several people were working

on, to keep records of information that someone else had given them, or to keep personal records. They did quite a lot of copying, often going back and forth throughout the day to the photocopier room to do small jobs. In general, the resources and functions of the place meant that there were many reasons for all staff to enter the photocopier room on a regular basis.

At PH, the photocopier room contained the department's mailboxes, increasing the proximity afforded by the room. Between 9:00 and 9:30 in the morning, the photocopier room was extremely lively as people came to pick up their mail and stayed to chat. They might visit the room several times during the day for their mail, in fact, as internal and external mail were delivered separately in the morning and internal mail was delivered again in the afternoon. In addition to the photocopier, the room held the shared printer and the fax machine. On the wall was a bulletin board with some information posted such as doctors' contact numbers, the schedule of mail pickup and delivery, and advertisements posted by the "comité d'entreprise" for theatre tickets, summer camps for the children, and so on. This department of the Publishing House had always been small with a rather informal structure. There were no administrators to do secretarial work for the professionals, except for the head of the group who had an assistant. At PH, copying was considered part of the job of the professionals: they made copies for the print shop; they made copies of the different states of the mock-ups of the books; they kept records of all the articles in the newspapers concerning the books that they or their competition had published.

At BS, the photocopier room contained, in addition to the photocopier itself, the department's shared printer and fax machine, and a supplies cabinet. It did not contain mailboxes or a bulletin board. The main difference between BS and RC or PH, however, is that BS had occupational roles defined that observed a division of

labor: Faculty usually did not do their own photocopying; they typically had their secretaries make photocopies for them. All large copying jobs were done by the school's central print shop. Thus, in practice, the main users of the photocopier were the three secretaries who shared the office next door. To avoid having to stand waiting, the secretaries carefully coordinated their copying so that there was only one of them in the photocopier room at a time. They also carefully coordinated who was in charge of maintaining the photocopier: refilling paper and toner, and repairing the machine. Very few people used the fax machine—secretaries sent and received faxes from their computer, and this fax machine was outgoing only—and many professors had printers in their offices and so they seldom used the shared printer either. The overall result was that the material forms and functions of the photocopier room at BS did not tend to bring people—let alone random groups of people—in proximity to another.

To see how these different characteristics come together to afford proximity, we offer an example from PH. Figure 7 presents a series of still images taken from a scene videotaped at 9:15 one morning. A staff member, Anne, is in the photocopier room alone making copies. A colleague, Beatrice, comes in to check her mail. Beatrice stands there going through her mail and making off-hand comments out loud to which Anne replies. At one point, Beatrice moves over to show Anne one of the documents she has received in the mail and asks for her opinion. Anne gives it and returns to her copying. A third person, Celine, enters the room to pick up her mail and stands there reviewing it. As Beatrice had done, she comments aloud in general terms about her post. As the video stills show, she is standing between Anne (who is still at the photocopier) and Beatrice (who has moved over to the side of the mailboxes). Celine moves between two conversations, shifting physically between

Anne and Beatrice. Rather than there being one conversation in the room, there are two: Beatrice and Celine speak about their mail; Anne and Celine speak about what they did the evening before. A fourth person, Denise, enters the room bearing a box of chocolates she has received as a professional Christmas gift from a bookseller. She offers the chocolates around and stays for three minutes chatting with her colleagues, all now as one conversation. They then all leave the room.

Figure 7 about here

We can see several indicative patterns in this episode. The interactions are made possible in the first place because of the presence of the shared resources in the room. Anne is there making copies and Beatrice and Celine enter to pick up their mail. Encountering Anne, Beatrice greets her and the two begin to speak. Encountering the two of them, Celine talks to them as she leafs through her mail. Once one or more conversations are ongoing in the small room, then we observe what we might call a critical mass effect where the activity comes to seem like a social event and others, able to observe this from the corridor as they pass by, may join (bringing their chocolates, perhaps) or stop by to see what is happening. The result, as can be seen in the video stills in Figure 7, is a group of people interacting at once with each other and with the physical artifacts in the room. For contrast, the final still in the series shows the pattern more typical at BS: one person alone interacting with the machine in proximity to no one.

Chance encounters were most common at PH. The photocopier room is centrally located, its layout is highly open and affords excellent visibility, and its material form and function draw everyone into the space several times a day. In RC we observed fewer chance encounters. The space is centrally-located in a highly-trafficked area,

but its enclosed layout affords low visibility and makes accessibility awkward. Unless they hear voices they recognize, people don't enter the room without intending to use one of the shared resources there. Those resources, making up the material form and function of the room are fewer than in PH. Chance encounters were rarely observed in BS. While the layout of the room is no more enclosed than at RC, the location of the space is much less central than at either of the other two sites and, for reasons of role definition, the material form and function of the room do not contribute to the proximity afforded by it.

Affording Privacy

A space affords privacy to the extent that it enables actors control of access to them individually or as a group (Altman 1975). For encounters to become interactions some level of privacy must be afforded. Privacy implies the ability to control the boundaries of the conversation. This has two dimensions. First, and perhaps most obviously, there is a spatial dimension. People must have confidence that they are heard by only those they want to hear them and that they are not overheard. The sensitive nature of many informal interactions—whether task-related or friendship-related—and the possibility that any discussion may eventually lead into sensitive areas makes this essential. Informal interaction in the absence of such privacy—talking in a corridor, for example—risks being silenced or broken up by the appearance of others with concerns raised about what the person might have heard. Second, there is a temporal dimension. Privacy implies control over access to oneself: when we choose to interact with others and when we choose to cease those interactions. To the extent that a space obligates us to interact with those we would prefer to avoid or prevents us from exiting an interaction when we desire, it does not

afford privacy in this dimension, and we may expect people to avoid the space and spend time elsewhere.

The location of a space may affect the privacy it affords, but in the sites we observed it was not decisive in this regard. At RC and PH, the same characteristics of location that afforded proximity made privacy somewhat problematic. Their centrality meant that people were passing by the room regularly and could overhear voices that were not kept quiet. Further, people were entering and leaving the room regularly. At BS, the photocopier was somewhat remote and isolated and therefore did afford a degree of privacy. In general, it seems that location effects on the affordance of proximity and privacy are in tension: a location that affords one tends not to afford the other.

More important than location in the sites we studied was their layout. Two aspects of layout, enclosure and visibility shaped the affordance of privacy. In terms of enclosure, all three rooms were what the architectural theorist Alexander (1977) calls "half-private." Similar to an alcove, they were partly enclosed and partly open, balancing the openness that affords proximity with the enclosure that affords privacy. Alexander (ibid.: 828-832) argues that such a semi-enclosed layout is ideal for informal interactions. A more enclosed space, while affording a greater opportunity to control the spatial boundaries of conversation would not only compromise proximity, but it would make egress more difficult. All else equal, the more enclosed a space is the more difficult it is to disengage from an interaction by leaving. Thus, the semi-enclosure of all three of the photocopier rooms balanced the two dimensions of privacy: control over access to the group and control over access to the self.

Despite the similarity of enclosure among them, differences in visibility marked the layouts of the three sites. At RC, the corner layout of the photocopier room

afforded privacy because it meant that people walking down the corridor could not see inside the room without special effort. However, this lack of visibility was reciprocal: people inside the copier room also could not see whether someone was approaching and about to enter the room or come within earshot. They had to go to the door and look out to ensure the corridor was empty before gossiping about sensitive topics and check again periodically during their discussion. Otherwise, they risked being startled and having to cut off their speaking in a way that would reveal to the entrant that they had been speaking of something he or she was not supposed to hear.

Visibility, then, cuts both ways. Low visibility affords privacy from prying eyes. However, in an office environment, especially in public spaces as we are studying, it may seldom be practical for informal interactants to avoid being overseen. High visibility, on the other hand, may afford a form of privacy by giving people information about the movements of newcomers that enables them smoothly to adjust their interaction to control what these others see and hear. In contrast to RC, at PH the photocopier room is a space with good visibility and actors could see in advance when they were about to have their privacy interrupted and would stop talking in time to avoid compromising the privacy of their conversation. In short, the presence of windows onto the corridor and open doors has an important, but subtle, influence on the perceived privacy of organizational spaces in situations where actors want the content of their informal conversations to remain private but they don't mind the simple fact of the interaction being publicly known.

At BS, the visibility afforded by the layout of the photocopier room was similar to that at RC. However, we observed no interactions to be disturbed by a lack of privacy at that site. If a space affords too little proximity to others then no amount of privacy

can foster informal interaction. Privacy is important for converting encounters into interactions, but this is not possible without encounters already existing.

It is also useful to consider the (often limited) degree to which a space affords privacy *within* it. In the case of the roughly two meter by three meter photocopier rooms we studied, there is not much privacy within the room. What control actors had over the boundaries of their conversation, they had to construct themselves using the furnishings of the room to divide it into separate territories. An interaction observed in PH illustrates how people interacting in the copier room enact such control. Joana was making copies when Claudia came in. The two of them had not seen each other in a while and they fell into discussion about Claudia's holidays and then begin to gossip about work-related matters. Joana finished making her copies and Claudia finished hers as well and so they moved to one side of the room to continue their discussion. Specifically, they moved over to the side of the room by the mailboxes. Photocopying brought them into proximity and the privacy afforded by the room allowed their encounter to become an interaction. While Joana and Claudia were talking, a third person came in, used the copier and left. Joana and Claudia were talking in low tones and were watchful of signs that the third person was listening in on their conversation while photocopying. Together at the side of the room they, in effect, created a separate area within the photocopier room away from the photocopier itself where they were less likely to be interrupted, though they may still have been overheard. After five minutes, they left together.

Affording Legitimacy

Legitimacy refers to the social definition of the space, and what is supposed, obliged, and allowed to occur there. For an encounter to become an informal interaction, the people involved must not only feel comfortable about what others will

see and hear—the issue of privacy—but also what others will *think*. A space affords legitimacy for informal interaction to the extent that it provides people with a "good reason" to stop and chat. People must not fear embarrassment or discredit if they are discovered in the space, if they stay in the space for a period of time, and if they talk to one another while they are there.

Location seemed to matter little in our three sites for legitimacy. The simple fact of the room being the "photocopier room" (the material form and function of the room) mattered much more than the physical location of the room. This does not mean that location could never be important for legitimacy. Interacting in spaces, which are very remote may look suspicious. People who are using a particular photocopier room when there is another closer to their office, for example, may be asked to excuse or justify their choice. More generally, if people are seen together in an unusual, untrafficked, significance may be attached to their interaction by observers, and questions raised.

Layout played a similarly small role in affording legitimacy for the informal interactions we observed. It is worth noting, however, that the doors of all three photocopier rooms remained open the entire period of our observations. Closing the door, which would have afforded greater privacy for two people already in proximity, was avoided, perhaps because it would have created legitimacy problems. An interaction behind a closed door, especially one that is normally left open, may seem neither natural nor innocent. The semi-enclosed layout of all three of the photocopiers rooms we studied apparently afforded sufficient legitimacy for informal interaction.

When we think of the archetypal office locations that foster informal interaction, many of them share the characteristic of housing a shared resource or technology that

provides legitimacy: the water-cooler, the coffee machine, the mailboxes, the cafeteria, the restroom and, of course, the photocopier. In settings such as RC and PH where everyone makes their own copies, the photocopier machine offers a high degree of legitimacy not only for being in the photocopier room but for remaining there even when one is not copying and for talking to others. This is for two reasons. First, not only is making copies a legitimate activity but so is *waiting* to make copies. Thus the room affords legitimacy to be present not only for the person operating the machine, but also for others standing next to the machine. They may be waiting their turn. Second, operating the machine requires constant physical presence but little mental energy. People using the machine seem "free" and available for "recruitment in interaction" (Backhouse, and Drew 1992). Conversation, under those circumstances, between someone operating the photocopier and someone waiting to use it is natural. Indeed, in the three contexts we studied, at least a brief exchange of words seemed to be obligatory. In contrast, at BS, where the secretaries did most all of the copying, it was so unusual for anyone else to be in the photocopier room that it was a source of surprise and comment by the secretaries if others—even the professors, who had the ostensible right to use the copier and who had each been issued a copy card—were discovered there. The professors had a clear legitimate right to use the photocopier machine as well as the fax machine and printer. But role definitions made *informal interaction* there seem strange and of uncertain legitimacy. What affords legitimacy for being present in a space, then, does not necessarily afford legitimacy for staying and chatting within it. Similarly, what affords legitimacy for a short chat does not necessarily afford legitimacy for a long discussion. It was common for a discussion initiated in the photocopier room to be continued in a private office.

The presence of multiple functions of the photocopier room could provide multiple legitimate reasons to be there and to stay there. At RC, people reading items posted on the bulletin board spoke to people photocopying. At PH, people checking their mail spoke to those using the photocopier. People using the photocopier and speaking to someone waiting would then stay in the room, checking their mail or looking at the bulletin board, while continuing to talk to the next person using the photocopier. As an informant at PH explained, even though people would go into the kitchen first thing in the morning to get their coffee, they wouldn't stop there to talk. Instead, they would come into the photocopier room. "The kitchen is just a corridor; it's not a comfortable place to stay. Moreover, in the copier room, there is the mail and if you make copies, you have to wait and you can chat with the others."

Ecological Impacts on Informal Interaction

The social and physical characteristics that afford the proximity, privacy, and legitimacy necessary for informal interaction are not independent. They are sometimes in tension: locations and layouts that put random collections of people in spontaneous proximity are those that tend to afford little privacy. They are sometimes reinforcing: the material forms and functions that afford legitimacy for being in an environment and interacting there are often those that draw people to that environment and in proximity to one another. They sometimes build on one another: characteristics affording proximity create encounters; these encounters will become interactions only if the characteristics of the environment afford legitimacy for informal interaction; these interactions, in turn, and will involve the sharing of significant task-related or friendship-related information only if the characteristics of the environment affords sufficient privacy.

An analysis of the interactions people had around the photocopy machine shows the importance of the machine itself—and, perhaps not incidentally, its propensity to breakdown or work improperly—as a conversational ice-breaker. Thus, many of the informal interactions we observed transitioned from encounters via an initial discussion about the photocopier or the process of copying itself. The material form and function of the photocopier room brought people in proximity and afforded an initial legitimacy for the interaction when then shifted into more personal or task-related topics if privacy allowed.

To analyze the dynamics of the three affordances, we constructed space-time "interaction maps" of a sample of the informal interactions captured on videotape. Specifically, we use the maps to examine how the use of the space by actors was associated with the content of their interactions. Table 2 gives a summary overview of the content of the all interactions we observed in the three sites. Figure 8 presents six representative interaction maps. The horizontal axis represents time elapsing. The vertical axis represents, roughly speaking, distance from the door of the photocopier room. Key objects in the room—the door, the area around the photocopier, the fax machine, and the supply cabinet and, in PH, the mailboxes, are shown along the y-axis (though not to scale). The arrows represent the movement of individuals within the room. The style of the lines (full, dashed, etc.) indicates the theme of discussion of that individual at that time. If we take as a simple example interaction map IM1 in Figure 8, "Negotiating access at PH," we see Katherine enter the photocopier room, go to the machine, and while she is making copies Debbie enters and walks to the area near the machine to ask Katherine when she will be done. Katherine tells her she has another set of copies to make and so we see Debbie leave and then, four minutes later, Katherine finishes her copying and leaves.

Table 2 and Figure 8 about here

In the sections that follow, we discuss three key themes of discussion—copier-related discussion, work-related discussion, and life-related discussions—and the specific types of discussion within those themes to give a micro-level indication of how the photocopier room afforded legitimacy and privacy that made these interactions possible and natural. The interaction maps help us to understand the ways in which these themes intertwine and legitimate each other. Note that proximity does not have a direct influence on the content of the discussions, nor on the shifts between topics, but it affords the encounters that are pre-requisite. Legitimacy and privacy are then necessary for these encounters to transform into specific types of informal interactions.

Photocopier-related interaction

There were three types of interactions concerning the photocopier itself. First, helping and collaborating. People would talk about the machine to solve a problem they were having with it. Interaction map IM2 in Figure 8 provides an example. Mary is trying to make double-sided copies and is unable to get the machine to do what she wants. She struggles with the problem on her own for four minutes until John enters the room to pick up a fax. As he is about to leave, he pauses at the door having noticed that something is wrong. He stares and her and moves toward her asking what the problem is. They work together for five minutes—taking turns pushing different buttons—and solve the problem. Second, new functionality. Rather than talking about a current problem, people learned from each other how better to use the machine. Third, negotiating access to the machine. At both RC and PH it was often the case that the resource—access to the machine itself—was in short supply,

forcing people to queue and to negotiate the terms under which one person might overtake another in the line because they had a very quick job to do, or were in a big hurry, or had higher status.

Work-related discussion

Work-related informal interactions were sometimes triggered by discussion about the photocopier itself and sometimes by discussion about the documents being photocopied. Interaction map IM3 in Figure 8, for example, diagrams the interaction of a PH employee, Eva, who is making a copy of an article, which reviewed a book, recently published by the company, and Margot who enters the photocopier room to pick up her mail. Margot says "Hello" and, in friendly tone, asks Eva what she is doing. Eva explains and shows Margot the article, and they begin a discussion about the book and then continue talking about other books published by PH, comparing their successes and failures. At RC, it happened on several occasions that researchers, upon observing what a colleague was photocopying, asked for copies for themselves. This sometimes led to a discussion of research ideas, currents interests, and what people were working on. At least once, such an interaction led to a new research collaboration.

A second pattern involved people using the opportunity provided by a chance encounter directly to engage in work-related discussion. For example, interaction map IM4 in Figure 8 diagrams the situation of a researcher at RC, Gerry, who is making copies when a colleague, Ann, enters the photocopier room to take a notebook and pens from the supply cabinet. While looking in the cupboard, Ann asks Gerry if she has called their client concerning a joint project: "Oh, I wanted to send you an email: Have you heard from Mr. Thomson?" Gerry replies in the negative, but

assures Ann that she will call the client by the end of the day if he has not gotten back to her by then.

A third pattern was associated with organizational gossip: the most frequently observed work-related interaction in the photocopier rooms. People gossiped about the internal politics of the company. For example, in RC: "I heard that they want to transform our department into a profit center and get us out of research and doing more consulting work." In PH: "Agnes told me that we might be downsized and incorporated in the Literature Department and relocated to the Headquarters building." They also gossiped about colleagues, revealing who they like and who they don't like, who should be trusted and who cannot and why. The degree of privacy afforded by the photocopier room was important for facilitating gossipy interactions, as evidenced by their interruption when someone else approached or entered the space. Equally important, though, was the affordance of the photocopier room of some legitimate topic to talk about first. Gossip was never once observed to be the opening type of discussion in an informal interaction. Rather, people would interact about something else that would then lead into gossip. This was sometimes photocopier-related. Other times, it was related to the other material forms and functions of the photocopier room.

For example, in RC, Rachel was making copies on morning when Sophie came in to make a copy. Rachel told her that she wouldn't be long and so Sophie decided to wait. While waiting, she stood looking at the items posted on the bulletin board. She noticed a newspaper article mentioning one of their colleagues who has just published a novel. She was surprised to learn this, and asked Rachel if she knew. Rachel did know and told her a bit more about the book and also the previous novel that this colleague had written. Gradually, the conversation shifted to Rachel asking Sophie if

she had fewer arguments with her boss these days. Sophie told her about a recent crisis. Rachel empathized and told her other stories she had heard about Sophie's boss. The legitimacy of waiting, the ability to talk while copying, the presence of the bulletin board providing topics for ice-breaking conversation, the privacy afforded by the copier room and the ability to control who was coming in the room: All of these combined to afford the interaction around this gossipy topic.

Life-related discussion

Discussions that started about the photocopier or about work often shifted to talk about other, non-work-related themes that we code as "life-related" for lack of a better label. Interaction map IM5, in Figure 8, for example, diagrams an interaction where Jane, a professor, is having problems using an advanced feature of the copier when Valeria, a secretary, comes in to make copies of her own. Valeria notices Jane not using the feature correctly and they talk about it and laugh and start chatting about their children while Jane makes her copies and Valeria waits. This life-related discussion continues for about three minutes until an error appears on the copier and then discussion returns to the machine and how to fix it. They fix it; Jane finishes her copying and leaves.

Other times, especially in the mornings at RC and PH when people would greet each other in or near the photocopier room, informal interaction began with spontaneous comments on the appearance of people or questions about how they were doing or where they were going or had been on holiday. Whether the conversation was initiated with copier or work-related discussion or with spontaneous questions and comments about appearance and well-being, the next move (if it came) was to discuss more personal topics: children sick and waking up during the night, likes and dislikes and expertise concerning movies and sports, views on current events heard on

the radio on the way to work, and so on. These discussions provide people a sense of attitudes and values of their colleagues and their similarities and differences. They are not work-related—yet their importance for work should not be ignored, as Hughes, Randal and Shapiro (1992) argue in their study showing that colleagues who met regularly in the bar at lunch time but never exchanged a single word related to their work established and developed relationships that affected the way in which they provided work services for each other at other times. In our case, these non-work interactions are legitimated by the "at work" context of the photocopier room and they are enacted because people feel that they have enough privacy so that their conversations will not be overheard without them noticing it, and that they can stop talking, or go back to a more neutral tropic if someone comes in.

Discussion and Conclusions

The theory of affordances provides a means of considering how the physical and social characteristics of an environment jointly influence the behaviors of actors in that environment without degenerating either into either extreme of physical determinism or social constructionism. People in an environment perceive the behavioral possibilities it affords. This, of course, does not mean they will necessarily engage in all or any of the afforded behaviors. For example, the theory of Broken Windows (Wilson, and Kelling 1982; Kelling, and Coles 1996)—made famous by the success of David Gunn, William Bratton, and Rudolph Giuliani in reducing crime on the subways and streets of New York City (Gladwell 2000)—postulates that environments with characteristics, such as windows that are left broken or boarded up, graffiti, and vagrancy, that signal a resigned acceptance of unlawful disorder are perceived as affording crime. This affordance may embolden criminals and frighten the law-abiding. The claim is not, however, that broken windows

determine crime any more than a slippery floor determines falling. The claim is that broken windows have a symbolic meaning associated with the affordance of crime. The social and the physical must be understood together; they are mutually constitutive.

In this paper, we develop a theory of the affordances of informal interaction. Taken together in their contradictory results, previous studies have shown that there is no simple, deterministic relationship between physical characteristics such as distance, open architecture, or the presence of shared resources and patterns of informal interaction. These environmental characteristics, and others, demonstrably matter but their influence can be understood only in the context of their symbolic meaning. Neither the social relations approach, with its assumption that bringing people into proximity with each other is sufficient to generate interactions among them, nor sociotechnical theory, with its focus on the importance of privacy for informal interactions, is sufficient to explain the ecology of informal interactions. Hatch (1987; 1991; 1997) has called for a theoretical perspective that builds on these approaches while also incorporating the insights of symbolic interactionism about meaning. We argue that the concept of affordance, along with the more traditional symbolic interactionist concepts such as role, can form the basis of theory that meets that call.

Specifically, we claim that characteristics of an environment influence patterns of informal interaction to the extent that they afford proximity, privacy, and/or legitimacy. That is, the extent to which they spontaneously bring random collections of people close enough together for them to be obligated to encounter one another; the extent to which they enable actors control of access to themselves individually or as a group; and the extent to which they provide people a socially acceptable reason upon

encountering each other to stop and interact. The exploratory data from our field studies, particularly RC and PH, suggest characteristics of photocopier rooms that make them so often a site of informal interaction: functional centrality, semi-enclosure, reciprocal visibility, easy access and egress, multiple shared resources, resources used regularly by all categories of people, resources requiring presence but little mental energy. The case of BS, where some of these characteristics were present, but not all of them, and few informal interactions were observed, reinforces the prediction that when proximity, privacy, and legitimacy are all afforded that informal interactions are most likely. This leads to our first proposition:

> **Proposition 1:** In environments that afford proximity, privacy, and legitimacy, informal interactions will be frequent.

The three affordances are not independent in their effect on informal interaction. The characteristics affording proximity and privacy are often in tension. The characteristics affording legitimacy and proximity are often reinforcing. The characteristics of all three sometimes build on one other cumulatively. Analyzing the separate effects of each affordance on interaction behavior, though, is possible and leads to predictions from the theory about environments that afford only a subset of the three.

Without the affordance of proximity, people do not encounter each other in an environment. With encounters, interactions are impossible. In a sense, proximity is a primary affordance: necessary, though not sufficient for informal interaction:

> **Proposition 2:** In environments that afford little proximity, there will be few spontaneous, random encounters and an equal or lesser amount of informal interactions.

The affordance of legitimacy is what enables people encountering one another to feel comfortable stopping to take time to interact in an environment:

> **Proposition 3:** In environments that afford little legitimacy, encounters among people will tend to be short and cursory and will seldom become full informal interactions.

Without the affordance of privacy, people will not feel comfortable speaking about important or confidential matters in a particular environment. They may initiate an interaction and agree to continue it in a more private space: beginning an interaction in the photocopier, for example, and agreeing to meet later in a private office to talk more:

> **Proposition 4:** In environments that afford little privacy, informal interactions will tend to be of short duration and not confidential.

Putting these propositions to the test will require a prior understanding of the environmental characteristics in a given social setting that afford the three affordances. This requires sensitivity to the organizational context and the broader culture (Gaver 1996).

Consider, for example, the case of SAS Headquarters, discussed earlier. The patterns of interaction observed by Grajewski (1993) are not surprising when considered in terms of affordances. The "street" and the "multirooms" afforded very high proximity. People from all over the company encountered each other in those environments. It was legitimate, at least officially, to interact there. But it is likely that these environments did not afford sufficient privacy for SAS employees to feel comfortable for most types of informal interaction. Thus, Grajewski found that over two-thirds of interactions occurred in private offices. This is not to say that the new building necessarily failed in its goal of increasing informal interactions. There is no data about the level of informal interactions, only their location. The "street" and "multirooms" as legitimate sites of high proximity may well be places where people encounter one another and agree to meet somewhere affording more privacy.

An interesting contrast is provided by the case of the LX Workplace Experiment at Xerox's Wilson Center for Research and Technology in Webster, New York (Horgen, et al. 1999). The LX Workplace Experiment was designed to change the space, organization, financing, and technology of the LX Lab to support the collaboration of a number of different groups who normally did not interact with one another. A physical environment, the LX Common, was created to support informal interactions. It was semi-enclosed, located at the center of the lab and traversed as people walked from the entrance to their labs, from one lab to another, and from the labs to the conference room, and it contained the kitchen, the photocopier machine and printers, the reference materials and other information sources of the "intellectual property area." According to Horgen and the SPORG team at MIT (who assisted in the design of the space and helped to evaluate the results of the change process), the experiment was a success in generating many informal meetings, with people of different backgrounds freely and regularly interacting informally throughout the day in the LX Common. "People who passed by a group at work in the Common felt free to listen in and, from time to time, to join the work at hand" (ibid.: 210). An unintended consequence of this interaction, however, was that technicians who did not wish to join one of these informal meetings but who needed to pass through the LX Common to reach their labs were found to be detouring several hundred feet to enter the labs through a rear door. The LX Common, in other words, did not afford sufficient control over access to the self and so technicians were avoiding it. Recognizing what was happening and how this was stunting the affordance of informal interaction, the lab manager intervened. He declared three rules: "(1) Traffic through the common was acceptable at any time. (2) Anyone was free to join any meeting in the Common. (3) Anyone was free to leave any meeting in the Common at

any time" (ibid.: 214). In our terms, what the lab manager did was to increase the affordance of proximity and privacy in the space by influencing the legitimacy of certain behaviors that might otherwise be seen as rude or intrusive. Thus we see how the three affordances of informal interaction entwine and reinforce each other.

More study is needed to analyze the patterns of relationship among the three affordances. Sometimes in tension, sometimes reinforcing, it may further be that the affordance of proximity, privacy, and legitimacy sometimes compensate for each other. In the Hawthorne Works (Gillespie 1991), for example, the proximity and privacy afforded by the T rooms appears to have been advantageous enough for there to be informal interaction even with only minimal legitimacy, though not enough to sustain interaction when it was made explicitly illegitimate. Qualitative studies of informal interaction in different organizational contexts could help us understand these relationships and how they vary. A limitation of the current study is that all of the observations of informal interaction were conducted in and around photocopier rooms. Broader ethnographic studies—well-suited for the collection of data about informal interactions—could provide insight into the effects of the affordances of informal interaction in different places and different cultural contexts. In particular, the issue of how the environment affords specific *types* of informal interactions, task-related, organization-related, life-related, and so on, is something whose surface we could only scratch with the data from our field studies. Finally, quantitative, confirmatory studies are needed to test the propositions we put forward.

Beyond its theoretical interest, the ecology of informal interactions has a practical importance. Increasing appreciation among managers of the influence of networks and social capital on performance and innovation has led even more organizations explicitly to redesign workspaces to increase informal interactions. Recognition of

the problems virtual teams and online communities face because of the difficulty, or impossibility, of face-to-face informal interaction has fueled an interest in how technologies may substitute the affordances of collocation. The question of how to create environments—physical environments, through architecture and workspace design, social environments through norms and organizational design, and technological environments through multimedia and systems design—that foster informal interactions has no single or simple answer, and certainly the current theory provides no recipes. But reframing the problem in terms of the affordance of proximity, privacy, and legitimacy is an important step in improving organizational practice and developing a rigorous theory of the ecology of informal interaction.

References

Alexander, Christopher
1977 *A Pattern Language: Towns, Buildings, Construction.* Oxford: Oxford University Press.

Allen, T. J., and P. G. Gerstberger
1973 "A Field Experiment to Improve Communications in a Product Engineering Department: The Nonterritorial Office." *Human Factors,* 15.

Allen, Thomas J.
1977 *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information with the R&D Organization.* Cambridge: MIT Press.

Altman, I
1975 *The Environment and Social Behavior.* Monterey: Brooks-Cole.

Backhouse, A., and P. Drew
1992 "The Design Implications of Social Interactions in a Workplace Setting." *Environment and Planning B: Planning and Design,* 19: 573-584.

Baldassare, Mark
1978 "Human spatial behavior." *Annual Review of Sociology,* 4: 29-56.

Becker, Howard S.
1998 *Tricks of the Trade: How to Think About Your Research While You're Doing It.* Chicago: University of Chicago Press.

Block, L. K., and G. S. Stokes
1989 "Performance and Satisfaction in Private Versus Non-Private Work Settings." *Environment & Behavior,* 21: 277-297.

Blumer, Herbert
1969 *Symbolic Interactionism: Perspective and Method.* Englewood Cliffs, NJ: Prentice-Hall.

Brill, M.
1984 *Using Office Design to Increase Productivity.* Buffalo: Workplace Design and Productivity, Inc.

Buttimer, Anne, and David Seamon
1980 *The Human Experience of Space and Place.* London: Croom Helm.

Carey, Alex
1967 "The Hawthorne Studies: A Radical Criticism." *American Sociological Review,* 32: 403-416.

Dalton, Melville
1959 *Men Who Manage: Fusions of Feeling and Theory in Administration.* New York: Wiley.

Davis, Tim R. V.
1984 "The Influence of the Physical Environment in Offices." *Academy of Management Review,* 9: 271-283.

Dean, A. O.
1977 "Evaluation of an Open Office Landscape: AIA Headquarters." *American Institute of Architects Journal,* 66: 32-39.

Emery, F. E., and E. L. Trist
1972 *Towards a Social Ecology.* London: Plenum Press.

Estabrook, M., and R. Sommer
1972 "Social Rank and Acquaintanceship in Two Academic Buildings." In W. Graham, and K. H. Roberts (eds.), *Comparative Studies in Organizational Behavior*: 122-128. New York: Holt, Rinehart & Winston.

Festinger, L., S. Schachter, and K. Back
1950 *Social Pressures in Informal Groups.* New York: Harper.

Franke, Richard Herbert, and James D. Kaul
1978 "The Hawthorne Experiments: First Statistical Interpretation." *American Sociological Review,* 43: 623-643.

Fried, Yitzhak
1990 "Workspace Characteristics, Behavioral Interferences, and Screening Ability as Joint Predictors of Employee Reactions: An Examination of the Intensification Approach." *Journal of Organizational Behavior,* 11: 267-280.

Gardner, Howard
1987 *The Mind's New Science.* New York: Basic Books.

Gaver, William W.
1996 "Affordances for Interaction: The Social is Material for Design." *Ecological Psychology,* 8: 111-129.

Gibson, James J.
1979 *The Ecological Approach to Visual Perception.* Boston: Houghton Mifflin.

Gieryn, Thomas F.
2000 "A space for place in sociology." *Annual Review of Sociology,* 26: 463-496.

Gillespie, Richard
1991 *Manufacturing Knowledge: A History of the Hawthorne Experiments.* Cambridge: Cambridge University Press.

Gladwell, Malcolm
2000 *The Tipping Point: How Little Things Can Make a Big Difference.* London: Little, Brown.

Goffman, Erving
1966 *Behavior in Public Places: Notes on the Social Organization of Gatherings.* New York: Free Press.

Goffman, Erving
1971 *Relations in Public: Microstudies of Public Order.* New York: Basic Books.

Grajewski, Tadeusz
1993 "The SAS Head Office: Spatial Configuration and Interaction Patterns." *Arkitekturforskning,* 2.

Hall, Edward T.
1966 *The Hidden Dimension.* New York: Doubleday.

Hatch, Mary Jo
1987 "Physical Barriers, Task Characteristics, and Interaction Activity in Research and Development Firms." *Administrative Science Quarterly,* 32: 387-399.

Hatch, Mary Jo
1991 "The Symbolics of Office Design: An Empirical Exploration." In P. Gagliardi (ed.), *Symbols and Artifacts: Views of the Corporate Landscape:* 129-146. New York: de Gruyter.

Hatch, Mary Jo
1997 *Organization Theory: Modern, Symbolic, and Postmodern Perspectives.* Oxford: Oxford University Press.

Herbst, P. G.
1974 *Sociotechnical Design.* London: Tavistock.

Hillier, Bill
1996 *Space is the Machine: A Configurational Theory of Architecture.* Cambridge: Cambridge University Press.

Homans, G.
1950 *The Human Group.* New York: Harcourt-Brace.

Homans, George C.
1954 "The Cash Posters: A Study of a Group of Working Girls." *American Sociological Review,* 19: 724-733.

Horgen, Turid, Michael Joroff, William Porter, and Donald A. Schon
1999 *Excellence by Design: Transforming Workplace and Work Practice.* New York: Wiley.

Hughes, John A., David Randall, and Dan Shapiro
1992 "Faltering from Ethnography to Design." *Conference on Computer Supported Cooperative Work:* 115-122. Toronto: ACM.

Hutchby, Ian
2001 "Technologies, Texts and Affordances." *Sociology,* 35: 441-456.

Ives, R. S., and R. Ferdinands
1974 "Working in a Landscaped Office." *Personnel Practice Bulletin,* 30: 126-141.

Jones, Stephen R.
1992 "Was There a Hawthorne Effect?" *American Journal of Sociology,* 98: 451-468.

Keller, Robert T., and Winford E. Holland
1983 "Communicators and Innovators in Research and Development Organizations." *Academy of Management Journal,* 26: 742-749.

Kelling, George L., and Catherine M. Coles
1996 *Fixing Broken Windows: Restoring Order and Reducing Crime in Our Communities.* New York: Free Press.

Kiesler, S., and J. Cummings
2002 "What do we know about proximity in work groups?" In P. Hinds, and S. Kiesler (eds.), *Distributed Work.* Cambridge: MIT Press.

Kornberger, Martin, and Stewart R. Clegg
2004 "Bringing Space Back In: Organizing the Generative Building." *Organization Studies,* 25: 1095-1114.

Kotter, John
1972 *The General Managers.* New York: The Free Press.

Kraut, R. E., S. R. Fussel, S. E. Brennan, and J. Siegel
2002 "Understanding effects of proximity on collaboration: Implications for technologies to support remote collaborative work." In P. Hinds, and S. Kiesler (eds.), *Distributed Work.* Cambridge: MIT Press.

Leibson, D. E.
1981 "How Corning Designed a "Talking" Building to Spur Productivity." *Management Review,* 70: 8-13.

Marcus, Thomas A., and Deborah Cameron
2002 *The Words Between the Spaces.* London: Routledge.

Mehrabian, A.
1977 "A Questionnaire Measure of Individual Differences in Stimulus Screening and Associated Differences in Arousability." *Environmental Psychology and Nonverbal Behavior,* 1: 89-103.

Monge, Peter R., Lynda White Rothman, Eric M. Eisenberg, Katherine I. Miller, and Kenneth Kirste
1985 "The Dynamics of Organizational Proximity." *Management Science,* 31: 1129-1141.

Newcomb, Theodore M.
1956 "The Prediction of Interpersonal Attraction." *American Psychologist,* 11: 575-586.

Norman, Donald A.
1988 *The Design of Everyday Things.* Cambridge: MIT Press.

Oldham, Greg R., and Daniel J. Brass
1979 "Employee Reactions to an Open-Plan Office: A Naturally Occurring Quasi-Experiment." *Administrative Science Quarterly,* 24: 267-284.

Oldham, Greg R., Anne Cummings, and Jing Zhou
1995 "The Spatial Configuration of Organizations: A Review of the Literature and Some New Research Directions." *Research in Personnel and Human Resources Management,* 13: 1-37.

Oldham, Greg R., Carol T. Kulik, and Lee P. Stepina
1991 "Physical Environments and Employee Reactions: Effects of Stimulus-Screening Skills and Job Complexity." *Academy of Management Journal,* 34: 929-938.

Oldham, Greg R., and Nancy L. Rotchford
1983 "Relationships between Office Characteristics and Employee Reactions: A Study of the Physical Environment." *Administrative Science Quarterly,* 28: 542-556.

Olson, Judith S., Stephanie Teasley, Lisa Covi, and Gary Olson
2002 "The (Currently) Unique Advantages of Collocated Work." In P. Hinds, and S. Kiesler (eds.), *Distributed Work.* Cambridge: MIT Press.

Peters, Thomas J.
1992 *Liberation Management: Necessary Disorganization for the Nanosecond Nineties.* New York: Alfred A. Knopf.

Pfeffer, Jeffrey
1992 *Managing With Power: Politics and Influence in Organizations.* Boston: Harvard Business School Press.

Pinto, Mary Beth, Jeffrey K. Pinto, and John E. Prescott
1993 "Antecedents and Consequences of Project Team Cross-functional Cooperation." *Management Science,* 39: 1281-1297.

Roethlisberger, Fritz J., and William J. Dickson
1939 *Management and the Worker: An Account of a Research Program Conducted by the Western Electric Company, Hawthorne Works, Chicago.* Cambridge, MA: Harvard University Press.

Schutte, J. G., and J. M. Light
1978 "The Relative Importance of Proximity and Status for Friendship Choices in Social Hierarchy." *Social Psychology Quarterly,* 41: 260-264.

Shepard, Jon M.
1971 "On Alex Carey's Radical Criticism of the Hawthorne Studies." *Academy of Management Journal,* 14: 23-32.

Sommer, R.
1969 *Personal Space: The Behavioral Basis of Design.* Englewood Cliffs, NJ: Prentice-Hall.

Stafford, Tom, and Matt Webb
2004 *Mind Hacks.* Sebastopol, CA: O'Reilly.

Steele, Fred
1973 *Physical Settings and Organizational Development.* Reading, MA: Addison-Wesley.

Strauss, Anselm L.
1987 *Qualitative Analysis for Social Scientists.* Cambridge: Cambridge University Press.

Sundstrom, Eric
1986 *Work Places: The Psychology of the Physical Environment in Offices and Factories.* Cambridge: Cambridge University Press.

Sundstrom, Eric, Robert E. Burt, and Douglas Kamp
1980 "Privacy at Work: Architectural Correlates of Job Satisfaction and Job Performance." *Academy of Management Journal,* 23: 101-117.

Sundstrom, Eric, R. Kring Herbert, and David W. Brown
1982a "Privacy and Communication in an Open-Plan Office: A Case Study." *Environment & Behavior,* 14: 379-392.

Sundstrom, Eric, J. Town, D. Brown, A. Forman, and C. McGee
1982b "Physical Enclosure, Type of Job, and Privacy in the Office." *Environment & Behavior,* 14: 543-559.

Sutton, Robert I., and Anat Rafaeli
1987 "Characteristics of Work Stations as Potential Occupational Stressors." *Academy of Management Journal,* 30: 260-276.

Sykes, R. E., K. Larntz, and J. C. Fox
1976 "Proximity and Similarity Effects on Frequency of Interaction in a Class of Naval Recruits." *Sociometry,* 39: 263-269.

Szilagyi, Andrew D., and Winford E. Holland
1980 "Changes in Social Density: Relationships with Functional Interaction and Perceptions of Job Characteristics, Role Stress, and Work Satisfaction." *Journal of Applied Psychology,* 65: 28-33.

Tobler, Waldo
2004 "On the First Law of Geography." *Annals of the Association of American Geographers,* 94: 304-310.

Turvey, M. T., R. E. Shaw, E. S. Reed, and W. M. Mace
1981 "Ecological Laws of Perceiving and Acting: In Response to Fodor and Pylyshyn." *Cognition,* 9: 237-304.

Ullman, Shimon
1980 "Against Direct Perception." *The Behavioral and Brain Sciences,* 3: 373-416.

Van Maanen, John
1991 "Playing back the tape: Early days in the field." In W. Shaffir, and R. Stebbins (eds.), *Experiencing Fieldwork: An Inside View of Qualitative Research.* Newbury Park: Sage.

Wells, B.
1965 "The Psycho-Social Influence of Building Environments: Sociometric Findings in Large and Small Office Spaces." *Building Science,* 1: 153-165.

Wilson, James Q., and George Kelling
1982 "Broken Windows: The Police and Neighborhood Safety." *Atlantic Monthly.*

Zajonc, R. B.
1965 "Social Facilitation." *Science,* 149: 269-274.

Zajonc, R. B.
1968 "Attitudinal Effects of Mere Exposure." *Journal of Personality and Social Psychology,* 9: 1-29.

Zalesny, Mary D., and Richard V. Farace
1987 "Traditional Versus Open Offices: A Comparison of Sociotechnical, Social Relations, and Symbolic Meaning Perspectives." *Academy of Management Journal,* 30: 240-259.

Zebrowitz, Leslie A. and Mary Ann Collins
1997 "Accurate Social Perception at Zero Acquaintance: The Affordances of Gibsonian Approach." *Personality and Social Psychology Review,* 1: 204-223.

Table 1: Summary of the characteristics affording informal interaction in the three field studies

Affordances	Key Characteristics: Location	Key Characteristics: Layout	Key Characteristics: Material Form & Function
Proximity	***Functional Centrality*** The environment is near a functional center of the office—near the entrance, lavatories, stairwell, or other place regularly visited by people throughout the day. **RC: +** **PH: +** **BS: 0** **Importance: HIGH**	***Visibility; Accessibility; Size of Space*** People in the environment can see those passing it and vice versa. The environment is easy to enter. The space is small enough to obligate people to encounter each other. **RC: 0** **PH: +** **BS: 0** **Importance: HIGH**	***Shared Resources*** Photocopier, water-cooler, coffee machine, office supplies, etc. Reasons that many different kinds of people need to enter the environment regularly. **RC: +** **PH: +** **BS: 0** **Importance: MEDIUM**
Privacy	***Remoteness; Isolation*** The environment is not central so that not many people are passing by it or through it that could oversee or overhear interactions. **RC: –** **PH: –** **BS: 0** **Importance: MEDIUM**	***Enclosure; Outward Visibility; Egress*** The environment is enclosed so that the spatial boundaries of the interaction may be maintained. People in the environment are able to monitor those passing or entering it. Barriers to exit are low. **RC: +** **PH: +** **BS: +** **Importance: HIGH**	***No function*** For ideal privacy, there would no reason for anyone ever to enter the environment. **RC: –** **PH: –** **BS: –** **Importance: LOW**
Legitimacy	***Local; Usual*** The environment is an obvious place for people to be or to pass through. It is not so remote, or unusual, or untrafficked that significance is attached to interaction there. **RC: +** **PH: +** **BS: +** **Importance: LOW**	***Open Doors*** Interactions in environments with open doors may seem more innocent and less worthy of note. **RC: +** **PH: +** **BS: +** **Importance: LOW**	***Shared Resources; Mindless Presence*** The environment contains work-related resources that all people employ and that demand presence but little mental energy to utilize. People are thus free for recruitment in interaction. **RC: +** **PH: +** **BS: 0** **Importance: HIGH**

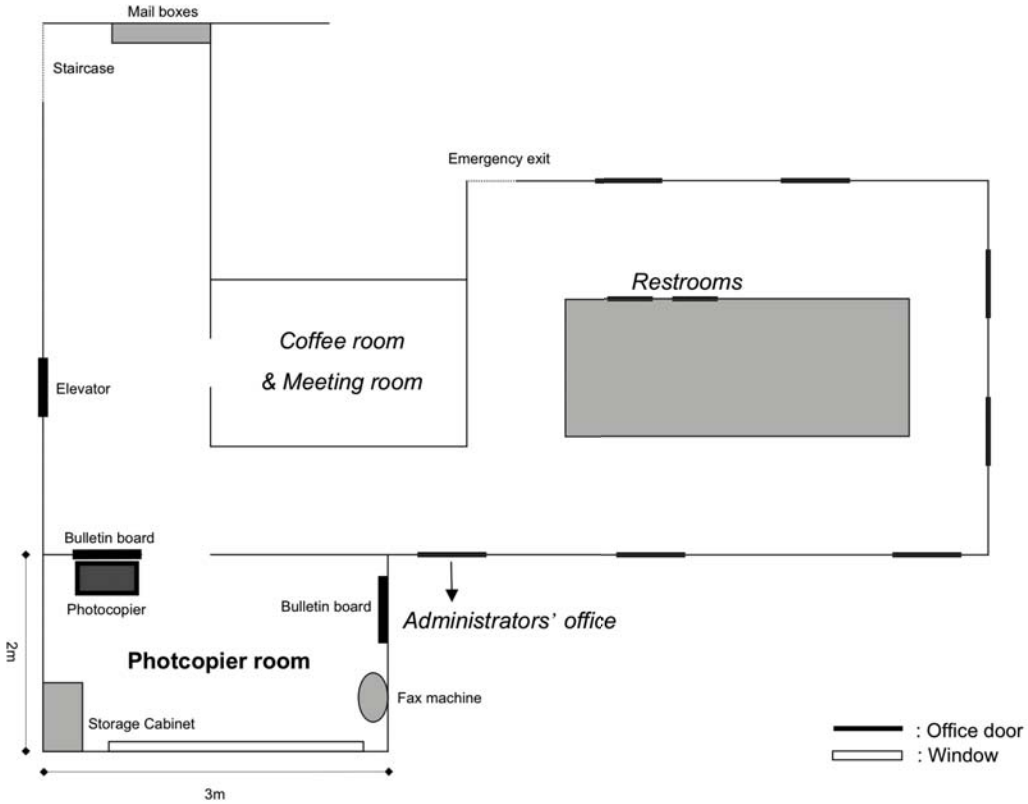
Table 2: Themes and types of discussion in informal interactions

Theme	Type	Example	Frequency		
			RC	PH	BS
Copier			+++	++	+
	Helping and collaborating	Valeria, a secretary comes in the copier room. Jane, a junior professor is making copies of a book. Valeria suggests a more efficient way to do copies using a book-copying capability built into the copier. Jane who had tried it several times unsuccessfully, preferred to stick to the old way. They chat while Jane is making her copies. The copier stops and an error message pops up. Jane tries to solve the problem following the instructions on the copier screen. After several unsuccessful trials, Valeria suggests to put the paper in another direction. She tries successfully. (BS) Mary, the head of a group is in the copier room trying to make double-sided copies, but she keeps getting an error message. She is staring at the copier, muttering and pushing buttons in all directions. John, the Head of the Department comes in and picks up a fax. On his way back, he pauses at the door and asks her what is her problem. She explains him. He goes and starts helping her. They check the manual, try out different solutions and finally succeed in making double-sided copies. (RC)	+++	++	+
	Teaching and learning	Eva is copying and stapling a job. Mary is lining to make copies. She sees the first stapled job coming out and she asked: "Oh, you know how to use the stapling function. That's useful! I don't know how to use it. Can you show me, please?" Eva shows her. (PH)	++	++	0
	Negotiating access	Eva is making copies. Dabney comes in and stands nearby the copier. Eva looks up and tells her that her job is long, and that she will better come back in a while. (PH) Katherine is using the copier machine. Debbie comes in and asks her: "Is it going to take a while?" Katherine answers that she has another set of copies to do. Debbie says that she will come back later. She leaves. (PH) Ann is making copies. Two other persons are lining for the copier. Justin comes in while Ann is finishing her job. He goes to the copier and starts doing his copies, telling the two other persons "It won't be long. I have only 3 copies to make. I'm in rush." He makes his copies and leaves. (RC) There was a senior researcher, Erin, who apparently was well-known in the department for making huge amounts of copies. The copier machine was also the shared printer. Long copying jobs might be interrupted by printing jobs arriving over the network. When this happened, Erin would complain angrily to whomever then came to pick up their print job. One of her colleagues told us that once she was about to go pick up a job that she had just printed but, when she heard Erin in the copier room complaining, she turned around and went back to her office instead.	+++	+++	0

Theme	Type	Example	RC	PH	BS
Work			++	+++	0
	Exchanging information	Eva is putting together some copies that she did of articles on a book that they have just published. Margot comes in to pick up her mail. She says, “Hello,” and while skipping through her mail, asks Eva what she is doing. Eva replies and they discuss the book and its success. (PH) Joana is making copies. Claudia comes in. Joana looks surprised. She tells Claudia that she has not seen her for a while. Claudia was on holidays. After talking about the holidays, Joana asked Claudia on which project and with whom she is working [Claudia is a freelancer]. Claudia replies that she just started working with Margot on a new book, and she said that she really likes working with her. They talked for a while about Margot and previous projects on which Claudia worked. (PH)	++	++	+
	Collaborating and following up	Gerry is making copies. Ann comes in to take a notebook and some pens. While looking in the supply cabinet, she asks Gerry if she had called someone she was supposed to call for a joint project. Gerry replies she does not have time, but will do it today. (RC) Charles comes in, while Ann is making copies. He tells her that he just got an email with some information regarding a project they are working on together. (RC)	++	+	0
	Politics and gossip	Rachel is making copies and Sophie comes in to make a copy. Rachel says that won’t take long. So Sophie decides to stay. While waiting she looks at the bulletin board and sees a newspaper article mentioning one of their colleagues who has just published a novel. She is surprised and asks Rachel if she knew. Rachel did know and tells her a bit more about this book and a previous novel that this colleague wrote. Rachel then asks Sophie if she has fewer arguments with her boss these days. Sophie tells her about a recent crisis. Rachel empathizes and tells her other stories she has heard about Sophie’s boss. (RC)	++	++	0
Life			++	++	+
	Hobbies, family, leisure activities	Joana is making copies. Claudia comes in. Joana looks surprised. She tells Claudia that she has not seen for a while and that she looks great. She asks her if she was on holidays. Claudia says yes. Joana asks where she went. They talked for 3 minutes about Claudia’s holidays. (PH) Valeria is queuing for the copier, while Jane, a junior professor is making copies. They chat and talk about their children. (BS)	++	++	+

Figure 1: Research Center Overview

Floor Plan:

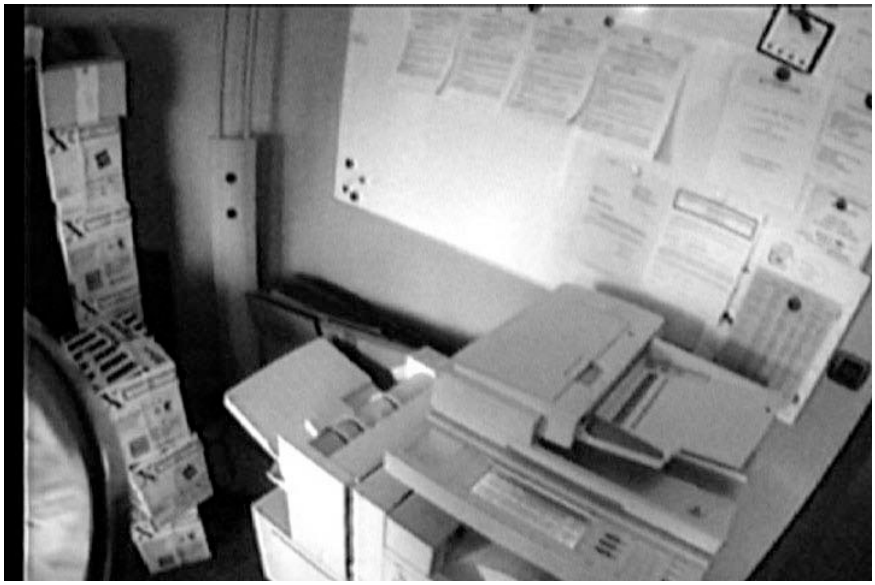


Technical Summary:

Space of department office:	Distributed on two floors
Location of the photocopier room:	Central
Pedestrian traffic past copier room:	Heavy
Windows:	On outside
Size of the department:	20 people
Number of users:	20: 12 frequent users; 8 less frequent users
Average number of people in the copier room when it is not empty:	Between 2 and 3
Percentage of time when it is empty:	30
Who makes the copies:	Everybody
Is there someone in charge of the copier:	Yes
Resources in the room:	Fax machine, photocopier (also functions as printer), office supply cabinet, 2 bulletin boards

Figure 2: Research Center Photos

RC1.



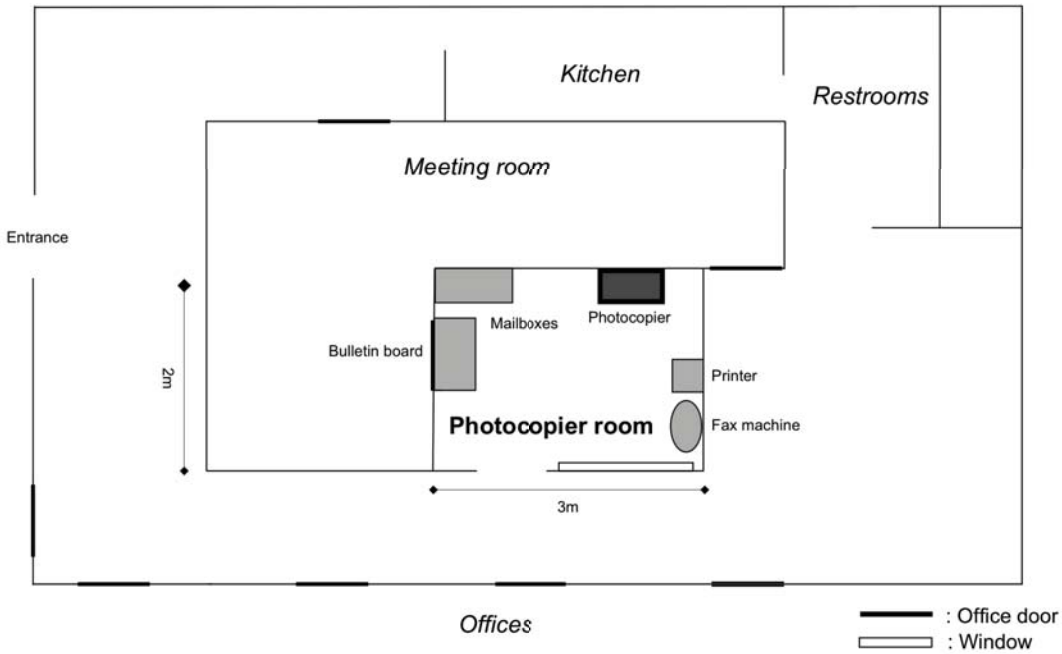
RC2.

RC3.

RC4.

Figure 3: Publishing House Overview

Floor Plan:

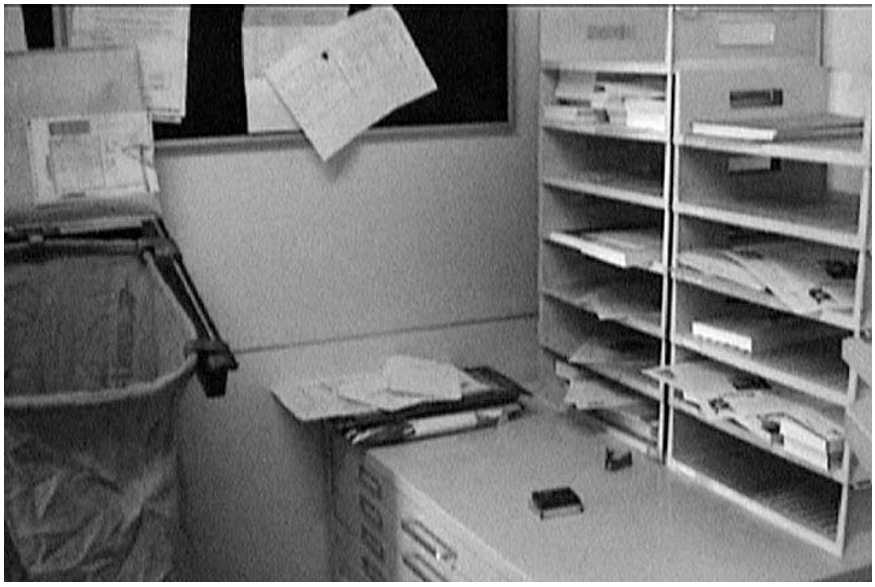


Technical Summary:

Space of department office:	One floor
Location of the photocopier room:	Central
Pedestrian traffic past copier room:	Heavy
Windows:	On the corridor
Size of the department:	8 people
Number of users:	8
Average number of people in the copier room when it is not empty:	Between 3 and 4
Percentage of time when it is empty:	30
Who makes the copies:	Everybody
Is there someone in charge of the copier:	No
Resources in the room:	Fax machine, shared printer, mailboxes, bulletin board, photocopier

Figure 4: Publishing House Photos

PH1.



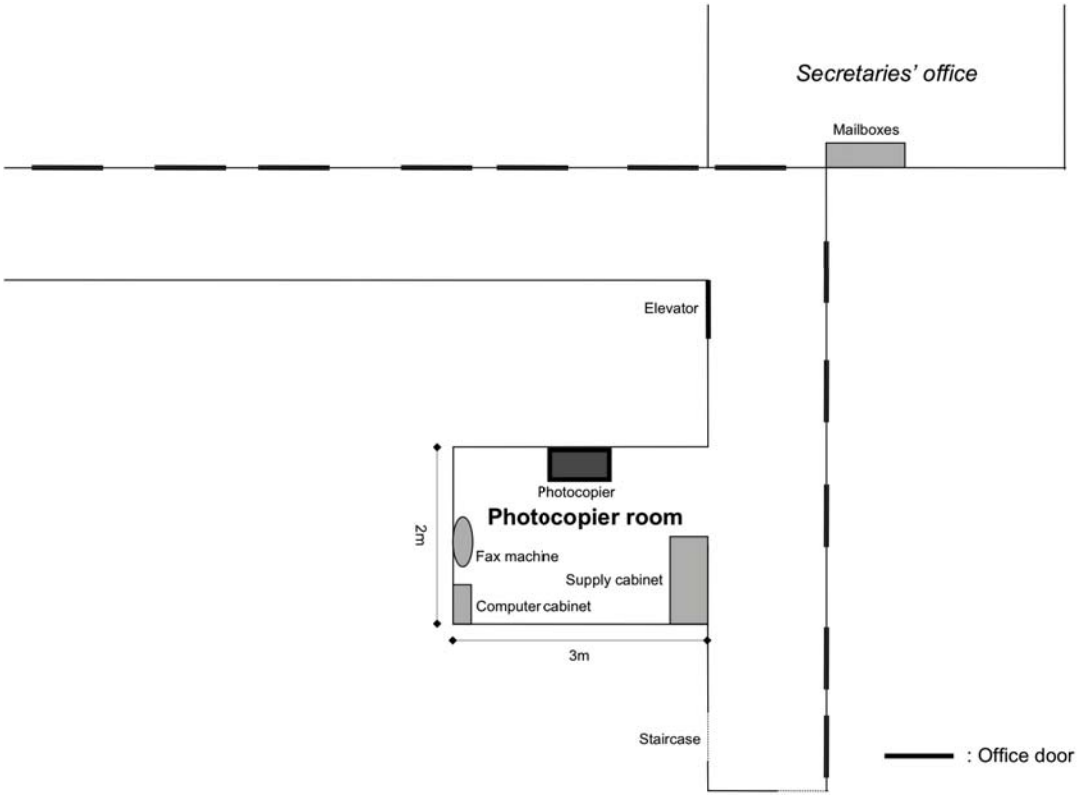
PH2.

PH3.

PH4:

Figure 5: Business School Overview

Floor Plan:



Technical Summary:

Space of department office:	Distributed on two floors
Location of the photocopier room:	Isolated
Pedestrian traffic past copier room:	Light
Windows:	None
Size of the department:	20 people
Number of users:	3 frequent users (the secretaries)
Average number of people in the copier room when it is not empty:	1
Percentage of time when it is empty:	80
Who makes the copies:	Mostly the secretaries
Is there someone in charge of the copier:	Yes
Resources in the room:	Fax machine, shared printer, office supply cabinet, photocopier

Figure 6: Business School Photos

BS1.

BS2.

Figure 7: Example Video Stills

VS1.

VS2.

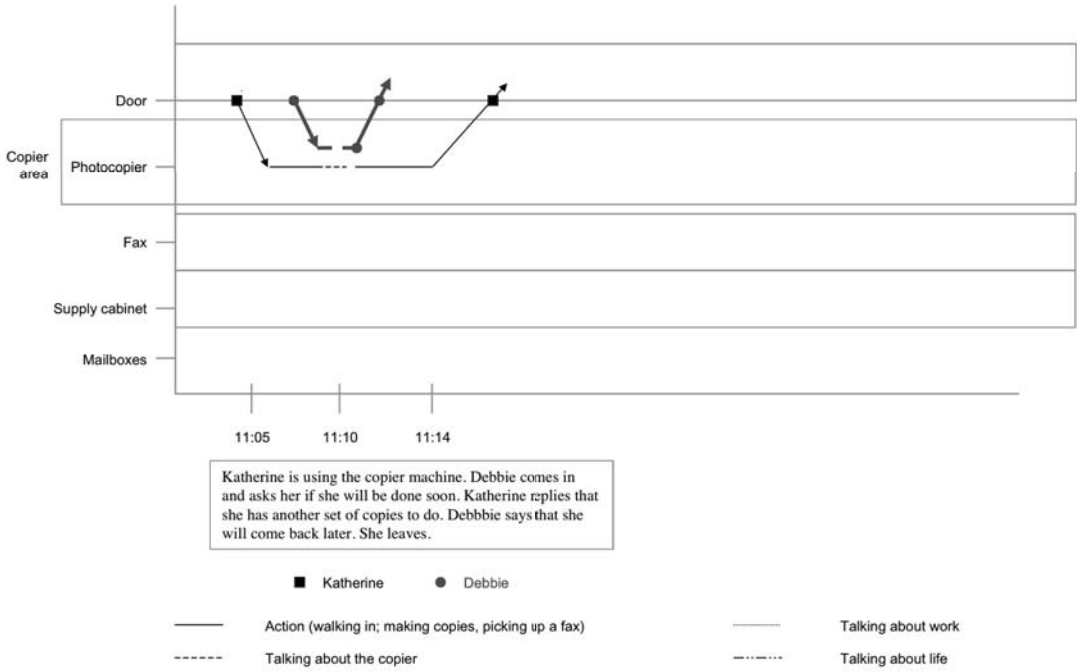
VS3.

VS4.

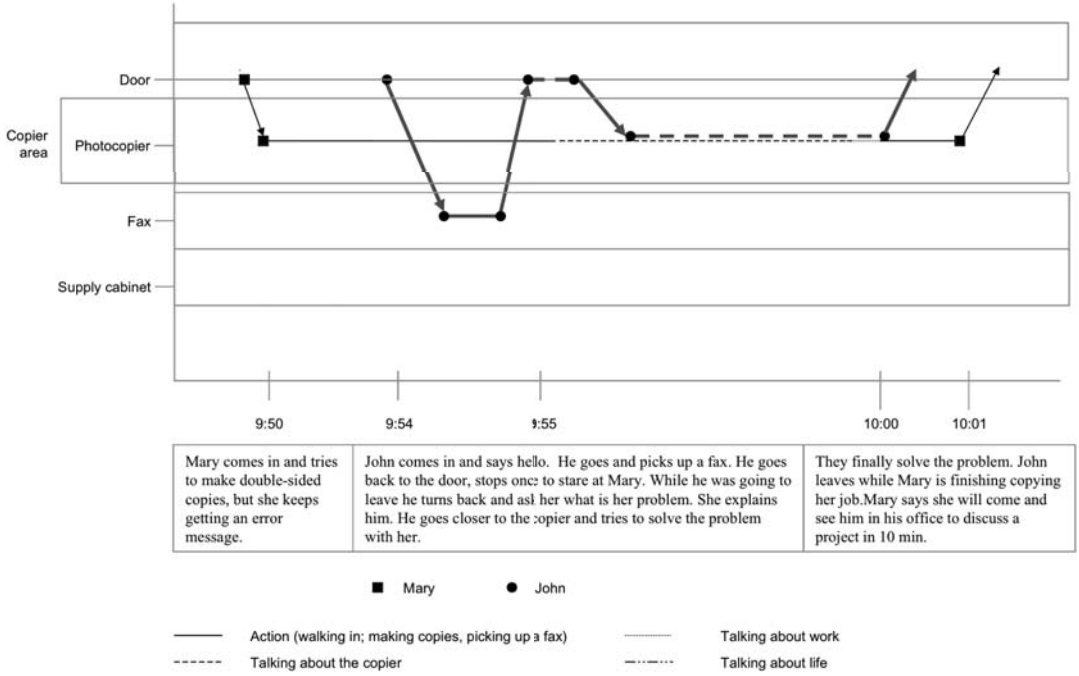
VS5.

Figure 8: Interaction Maps

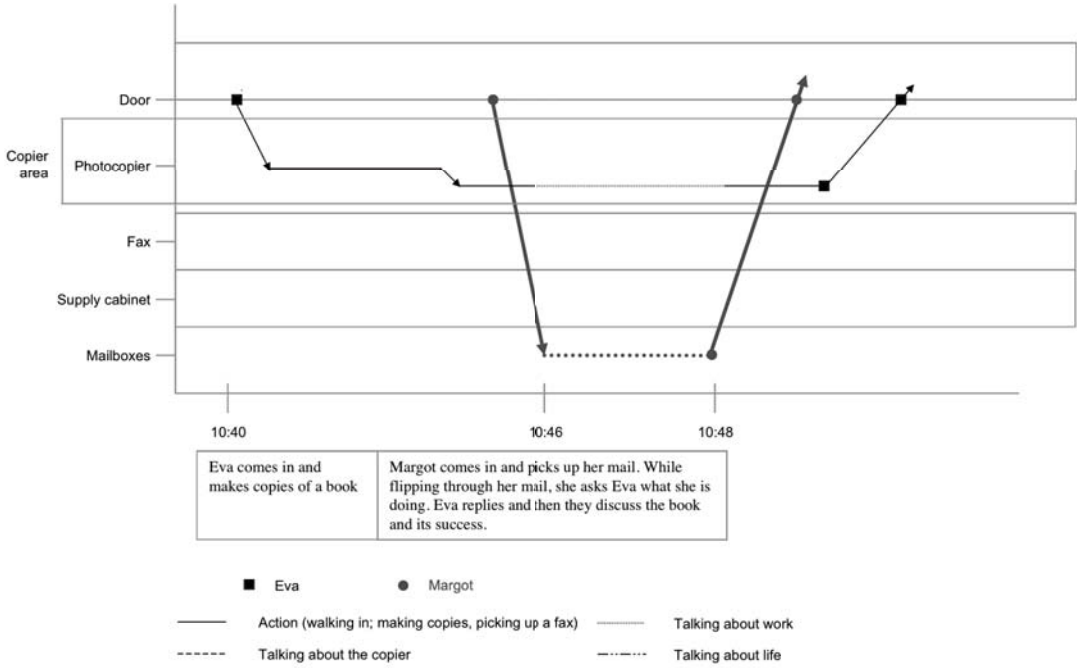
IM1: A simple example of negotiating access at PH



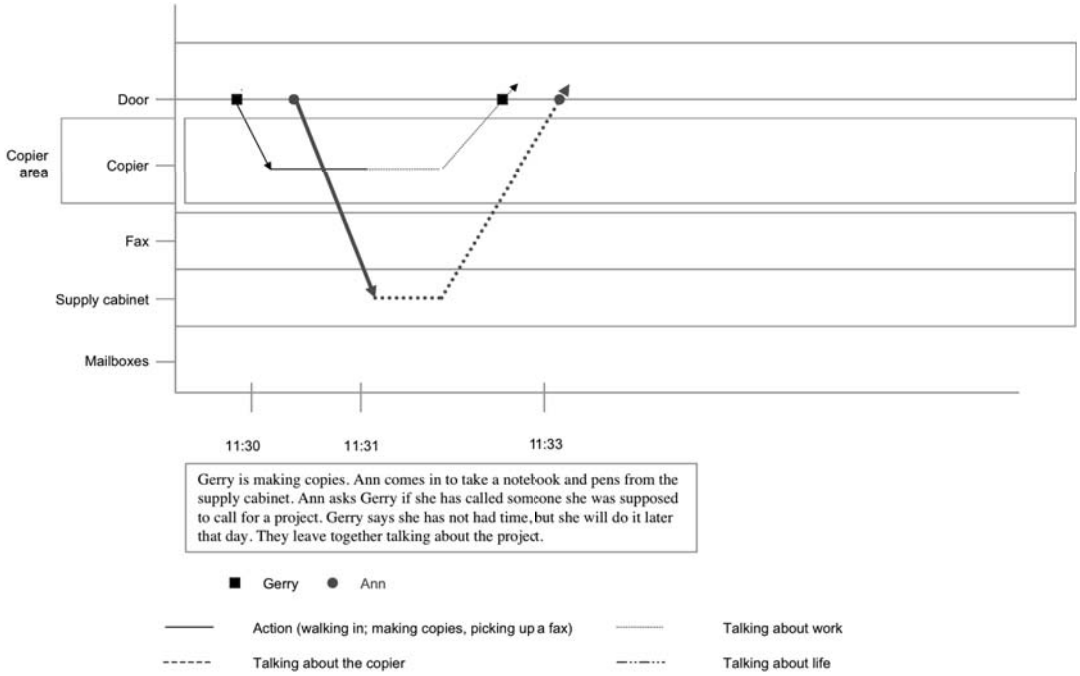
IM2: Collaboration around the copier at RC



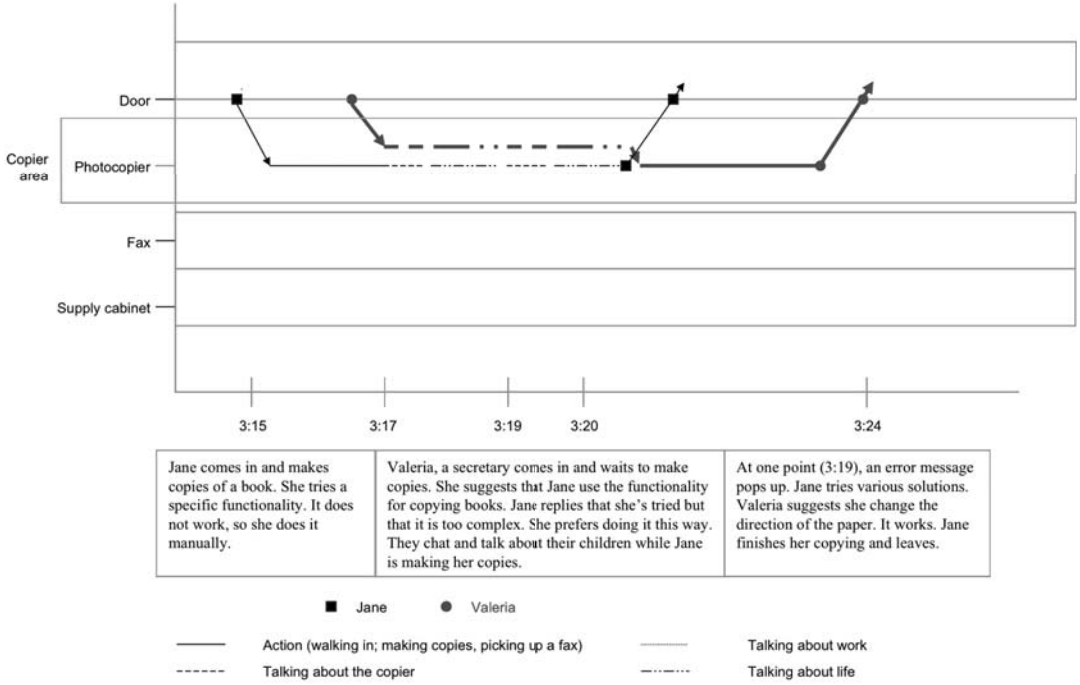
IM3: Exchanging information at PH



IM4: Coordinating collaboration at RC



IM5: Intertwined copier-related and life-related discussion at BS



Jane comes in and makes copies of a book. She tries a specific functionality. It does not work, so she does it manually.	Valeria, a secretary comes in and waits to make copies. She suggests that Jane use the functionality for copying books. Jane replies that she's tried but that it is too complex. She prefers doing it this way. They chat and talk about their children while Jane is making her copies.	At one point (3:19), an error message pops up. Jane tries various solutions. Valeria suggests she change the direction of the paper. It works. Jane finishes her copying and leaves.