

Supporting Communication Within Domestic Settings *

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Abstract. Current research has identified social communication as a primary area of technological development in the networked home of the future. The primary research focus is on supporting 'phatic' communication – i.e., on supporting communication that is mediated by words, whether spoken or written and co-located or distributed. We provide an ethnographic study of mail use in the home to show that phatic communication is itself mediated through the social construction of visual displays that support the at-a-glance coordination of practical action and the management of domestic affairs. These 'coordinate displays' are distributed around the geography or ecology of the domestic space. Their explication opens up new possibilities for the development of communication technologies for domestic employment, particularly the design of networks of ecologically situated and mobile displays that support the visible and timely flow of information around the home.

Keywords. Domestic settings, ethnography, communication, mail use.

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Introduction

Communication is one the primary factors driving computer use in the domestic environment. Recent work in the field has suggested that 'phatic' communication is of primary relevance to the design of social communication technologies for employment within the networked home of the future [16]. Phatic communication is defined as,

... a type of speech in which the ties of union are created by a mere exchange of words. [25]

Here we can see the design assumption that communication technologies should support human relationships within domestic settings, a focus that is in a sharp contrast to 'smart homes' research which seeks to automate the domestic space. How and in what ways human relationships are to be supported through the design of communication technologies is, of course, the open question?

The Casablanca project has opened up the research challenge through the design of several early prototypes including the *CommuteBoard*, a distributed messaging system that exploits audio-based sensing and allows members located in different households to communicate with each other and to coordinate their practical actions (such as organizing shared rides to work).

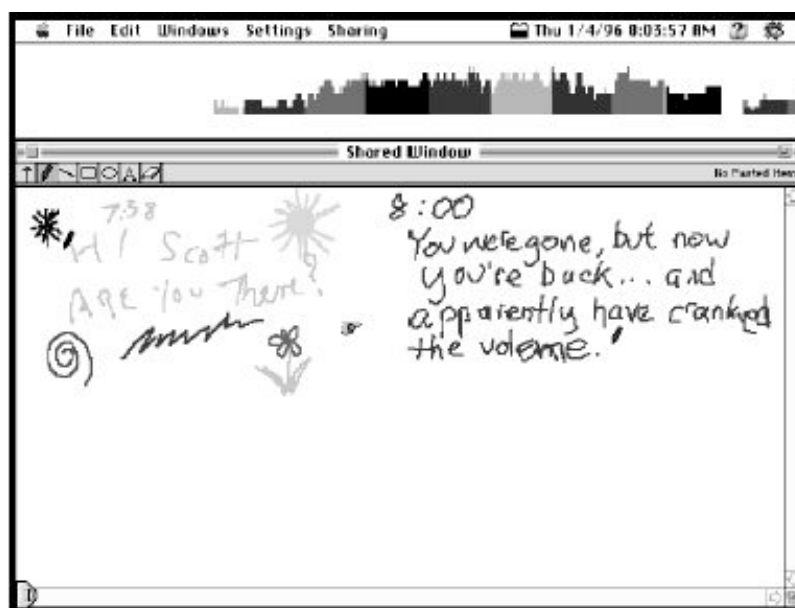


Figure 1. Supporting communication: the CommuteBoard (Hindus et al. 2001)

Here we can clearly see that phatic communication – the exchange of words - is primarily mediated by a visual display. We call such displays ‘coordinate displays’ [5], a notion which is intended to draw attention to the social construction of communicative displays within domestic settings to support the coordination of practical action. In saying that coordinate displays are ‘socially constructed’ we mean to point out that household members *observably assemble and display* communications for one another over time and in orderly ways (through taking turns at writing and reading messages, for example), at certain sites in the home (such as at the computer interface). Such sites demonstrably mediate phatic communication, support coordination, and open up an “enormous” design space for domestic communication technologies [16].

Exploring the Design Space

Paying attention to the orderly ways in which communication sites – or coordinate displays - are socially constructed within domestic settings promises to open up new possibilities for the design of new communication technologies that support the unique demands of home use. One area that immediately springs to mind is that of email. Email is the most prolific network technology and has driven the global growth of the Internet [9]. It is prominent in the workplace and as the computer moves into the home we might expect the growth of email communication to continue to grow. Current configurations of email technology, which see computer-based communication confined to a corner or some other outpost of the domestic space or to small mobile interfaces, inhibit the potential uptake of communication technologies within domestic settings, however [15].

Ethnographic studies of communication mediated by mail in the home suggest that there is a distinct *mismatch* between current technologies and the orderly uses of mail in the interactions of household members (ibid.). One reason for this mismatch is that current technologies (such as desktop PCs and laptops) were designed for use in industrial settings and have otherwise made their way into home life by serendipitous means following the rapid and unexpected growth in the mobile phone market. Whatever the case, none of the existing technologies on the market were designed for use in the domestic environment and, as a consequence, their utility is limited or constrained [28]. New, bespoke technologies are required.

Another reason for the mismatch is the technological focus that has driven the design of communication technologies. Almost all previous and current research focuses on email; focuses, that is, on existing technological applications. It pays little if any attention to the orderly ways in which mail-based communication was

mediated prior to the implementation of email or is mediated in addition to email. As a result, it might be argued that design in this area suffers from a problem of ‘tunnel vision’, where the focus is on elaborating current technology rather than on exploring the wider context in which the technology is to function. While it is widely recognised that email technologies fail to adequately support the activities and tasks that are demanded of them by users in the workplace [19, 14, 8], the design effort remains fixed on development at a single site as design moves into the home: namely, on the monolithic *interface* [23, 32].

The mismatch suggests that there is a need for design to broaden its focus, especially when approaching the domestic environment which lacks the computational sophistication of the workplace. Instead of focusing on the computer, on email, and on the re-design of the interface, we would suggest that design needs to take a step back and broaden its horizons. As Venkatesh and Nicosia [31] put it,

... in order to understand the adoption/use issues of computers, one must view the total technological space of the household ... very little insights will be gained by looking at computers alone.

We concur with this point of view and suggest that rather than focus on the email interface, design might instead attend to sites in the household where *interfacing* goes on [1], thereby elaborating the orderly ways in which mail-based communication is socially constructed, and reflexively identifying potential sites for the design of novel communication technologies that support the unique needs of household use.

We invoke the notion of ‘interfacing’ to draw attention to the distributed sites where users construct interfaces over the temporal course of their interactions. We are not concerned with the interface as some unitary concept or monolithic site, but with the orderly ways in which members together construct interfaces to display their communications and coordinate their practical actions. It might otherwise be said that in addressing mail-based communication in the home, we are concerned to identify a heterogeneous collection of distributed communication sites that are constructed where member’s trajectories collide; sites at which communications are observably assembled and displayed so as to provide for the coordination of independent courses of practical action. Our concern to understand interfacing is, then, a concern to open up the design space through the explication of existing coordinate displays in the home.

Consequently, we to wish consider a number of alternate design issues, which we believe radically effect technical considerations. These include:

- What coordinate displays already exist in a setting?
- Where are coordinate displays currently located?

- How are coordinate displays situated in a setting?
- Why or for what purposes are coordinate displays constructed?

In addressing these issues we caution against employing restrictive technical concepts that reify the notion of an interface or coordinate display. We are not interested in technical definitions, but in the craftful ways in which the inhabitants of a setting address the above issues. It might be said that instead of employing some conceptual formulation to address these issues we are concerned to establish where household members see coordinate displays as residing? What *they* treat them as being? Between what distributed entities? With what properties? And to what ends do they employ them?

Methodology

As design moves from the workplace into the home it is widely recognised that new methods are required to support the development of appropriate technologies. Gaver [13] articulates the problem here with some clarity:

There is a danger that as technology moves from the office into our homes, it will bring along with it workplace values such as efficiency and productivity at the expense of other possibilities.

When approaching the domestic, design needs methods that are appropriate to the settings in which future technologies will be embedded and used. In other words, design requires contextually-sensitive methods.

Gaver offers a prominent contextual approach in the form of Cultural Probes [12], which have been adapted for domestic employment.

Domestic Probes are kits of provocative materials meant to elicit inspiring responses from people. We use them to learn about people's home lives for our research on domestic technologies ... The returns offer fragmentary glimpses into the rich texture of people's home lives. They allow us to build semi-factual narratives, from which design proposals emerge like props for a film. [7]

While it might be argued that the value of Domestic Probes has yet to be concretely established, some modest success has been achieved in residential care settings where probes have been adapted to supplement conventional *ethnographic* inquiries and provide contextual information to design (rather than inspiration for design) [6].

Ethnography has been of considerable utility in work-oriented design, providing rich insights into the nature of work-in-context [17], and has promised

to do so in a domestic context for some time [29]. When considering the potential role of ethnography in supporting design in domestic settings it needs to be appreciated that, strictly speaking, ethnography is not actually a method, but a gloss on various competing *analytic frameworks*. As Shapiro [26] puts it,

While 'ethnography' as a term strikes a useful contrast to traditional methods of requirements capture, within sociology and anthropology themselves it denotes rather little. It marks a distinction between quantitative and qualitative approaches to social science and carries with it a commitment to a period and degree of immersion in the social setting being studied that is sufficient to reach a qualitative understanding of what happens there. These are important matters, but beyond this, ethnography can be put to the service of virtually any theoretical school: there are, for example, functionalist, structuralist, interactionist, Weberian and Marxist ethnographies.

As ethnography is not a method but a gloss on a veritable host of analytic perspectives on social life and social activity it does not need to be adapted to support design in a domestic context: ethnography is not a tool that needs reconfiguring but a way of seeing and interpreting social action. Indeed, ethnography has already provided valuable insights into domestic life and the role of technology in the milieu of domestic activities [30, 20, 21].

One particular analytic perspective that has been widely employed in workplace design, and which continues to inform systems development as design moves into the domestic [22], has been that of the ethnomethodological mode of analysis [4]. Ethnomethodology [11] replaces a concern with the use of theories and models for a concern with the 'thick description' [24, 27] of the work manifest in members' observable and reportable interactions. The ethnomethodological notion of 'work' does not refer to either paid or (as one might find in the home) unpaid labour. Rather, 'work' refers to the discrete and recurrent sequences of practical action whereby persons construct, organize and reflexively coordinate their mutual activities in their interactions together [10]. Making these recurrent real world, real time sequences of action or 'work-practices' visible and available to reflection in design is the primary concern of the ethnomethodological analytic [3].

It is a grossly observable feature of member's interactions everywhere that they are frequently mediated by technical artefacts [2]. These artefacts range from the simple pen and paper to sophisticated electronic and computing equipment. When explicating the work manifest in member's interactions in the home ethnomethodology will be concerned, then, to make the coordinate uses of technical artefacts in human interaction visible and available to reflection in design. Below we consider a concrete empirical instance of mail-based communication in the home, both as a means of elaborating ethnomethodological study and as a resource informing the development of future technologies supporting communication within domestic settings. The empirical instance

presented is not representative in a numerical sense, but is instead concerned to examine actual empirical events in their observably orderly details so that we may learn what we can of the ways in which technical artefacts are actually used in human praxis [18].

An Empirical Instance of Mail Use in the Home

Handling mail is a routine activity central to the coordination of domestic affairs. Mail occasions such mundane yet crucial actions as the paying of household bills, attending routine health checks or school meetings, taking the children to parties, etc. The following empirical instance explicates the interactional work involved in mail use that provides for the coordinate accomplishment of a host of contingent and divergent activities occasioned by the arrival of mail. The coordinate accomplishment of such activities relies upon the social construction of a series of visible communication sites where mail is displayed and interfacing goes on. The work involved in handling mail elaborates a series of discrete yet interrelated coordinate displays, the orderly character of which transcend individual and idiosyncratic properties that are often said to mark out the home as a unique or distinctive environment. The social ordering of mail-based communication in the home is, in other words, generalisable.

Mail is typically collected from some central point, whether that point is located at the front door, in the grounds outside a house, or from a post box located elsewhere in an apartment block. Depending on the contingencies of location, the collection point for mail is one at which interfacing may go on and may simply consist of this: seeing that mail has arrived. Mail may be collected by any household member - in some homes the same person might do the job all the time, whereas in others it simply depends on who gets up first or who is home first. The point to note here is that the collection of mail by household members is not coordinated through the nomination of a 'collector' but through the public availability of a shared and known in common collection point and, contingently, on the visibility of mail. Any household or group member can collect the mail (not anyone can open it, however).



interface 1. The porch: a shared and known in common collection point.

Having collected the mail, it must be sorted (even one single piece of mail requires sorting). The person acting as collector has certain taken for granted rights and expectations attached to their position. It is assumed by members that persons acting as collectors who are also ‘householders’ (i.e. persons who are responsible for the running of the household) have the right to open mail concerning the maintenance of the home (e.g. bills) and formal matters concerning junior household members (e.g. letters from school concerning children). The opening of mail is not necessarily ordered by recipient name on an envelope, then, but by entitlement to open such mail. The point here is that there is often a visibility to mail that displays and so announces its practical character: what it is about, who it is from, and who may thus be an appropriate recipient and so be entitled to open it. This is often conveyed by a logo, organizational stamp, postmark, or the printing of the sender’s name on the outside of the envelope (see interface 2, for example). The visibility of the practical character of mail allows the collector to make judgements as to the relevance of mail to the home and to household members. It is in this respect that members come to categorise certain mail as ‘junk’, to do so at-a-glance, and to respond to the categorisation by throwing the designated mail away. Junk mail is not always so easily spotted however, as categorisation is a matter of judgement rather than given in advance. Consequently, the collector may open mail and browse through it to establish its relevancy status.



interface 2. Displaying and announcing the practical character of mail: the phone bill arrives.

Mail that is deemed relevant to other household members is organized in a variety of unique ways. The recipient may decide that the mail received might be of interest to other household members. The relevance of mail to other household members is ordered through particular assemblages of coordinate display, with each assemblage articulating particular relevancy statuses. Mail which a recipient deems to be of relevance to others in general is displayed in a public location, again shared and known in common, where it is plainly visible (see interface 3, for example).



interface 3. Placing mail of relevance to others in general.

The precise location for such displays varies from household to household as the construction of coordinate displays is contingent upon the particular material arrangements of domestic space. Common places include mantelpieces, bureaus, or tables, but other places may be used as the contingent arrangements of domestic space allow.

Mail that is deemed to be of relevance to a particular household member is often displayed in a different location that is *relevant to* the member in question.



interface 4. Displaying mail of relevance to a particular household member.

Typical sites for displaying mail of relevance to particular others include the person's place at the kitchen table (as above), the place he or she usually sits when relaxing, and such mail may even be placed outside a bedroom door. The recipient designed and accountable character of mail displays enable members to see at-a-glance that mail has arrived that requires their attention and action.

Opened mail that has been viewed is also displayed according to its relevance to practical action. The display of opened and viewed mail is ordered by the temporal flow of sorting work and the ordering of mail into discrete groupings that reflect the actions required at-a-glance. Again, the construction of these displays is contingent upon the material arrangements of domestic space. Mail for external use, such as the payment of bills, is placed in a location that reflects the need for external action: e.g. on a desk in the hallway, at the front of the kitchen table, or next to a bag that is routinely taken along when a person leaves the house.



interface 5. Display for external use **interface 6.** Display for internal use

Mail for internal use is displayed in an alternate location: e.g. on top of the stereo, on top of the bureau, or at the back of the kitchen table. While particular locations vary from home to home, this latter arrangement is effectively a 'pending pile'. It may contain mail for external use if it is not of immediate relevance. When sorting through the pending pile it may also transpire that particular items are no longer relevant and so they may be trashed. Opened mail may accrue in the pending pile until it is felt that some further action should be taken. Further action may lead to the display or movement of mail to other discrete sites that are tied to the projected relevance of mail. Accordingly, mail may be displayed on a noticeboard (which may be nothing more than a designated space on a wall). Noticeboards are used as a place to display mail of short-term relevance: things

like invoices, concert tickets, appointment cards and invitations, and longer-term information that is frequently consulted, such as school term dates, restaurant menus, etc. Mail of longer-term relevance, such as mortgage statements, legal paperwork, financial affairs, etc., is filed away in dedicated location organized for storage and retrieval: e.g. in a bureau, drawer, or filing cabinet.



interface 7. Placing mail of short-term relevance.

Designing for Email Use in the Home

The instance makes it visible that members construct a series of discrete yet interrelated coordinate displays to concert activities occasioned by the arrival of mail. In handling mail, members demonstrably construct a series of interconnected, ecologically distributed coordinate displays that are recipient designed and accountable, thereby providing for awareness, inference, and action. In the context of home-oriented design the construction of coordinate displays articulates potential application areas for design that transcend the individual and idiosyncratic.

While sites for the construction and distribution of specific displays may change from home to home as a result of architectural and aesthetic differences, the actual construction of coordinate displays is not so plastic. Regardless of architectural and aesthetic contingencies members routinely construct coordinate displays to organize their activities (e.g. the paying of bills, attending school meetings or a party, etc.). It might be said that the coordination of action is conducted through the 'methodic' construction of coordinate displays, where the method of the matter is understood to refer to the construction of coordinate

displays in such ways that regardless of architectural and aesthetic contingencies *members* can see, and see at-a-glance, that items so displayed (e.g. on the mantelpiece, stereo, or that part of table) are items for others in general, particular others, for internal use, and external use, etc. The methodic construction of coordinate displays gives the work implicated in handling mail its orderly character and transcends the idiosyncratic and individual, illuminating the *different* and often *subtle kinds* of coordinate display that are constructed in a setting and serve to articulate potential application areas for design.

If we consider the development of electronic mail for domestic settings, for example, existing displays are largely confined to a single screen situated in a fixed location in a corner or some other outpost of a room where the computer often lives. Clearly, such interfaces ignore the *spatial* and *temporal* construction of coordinate mail displays across a *variety of sites* in the domestic space.

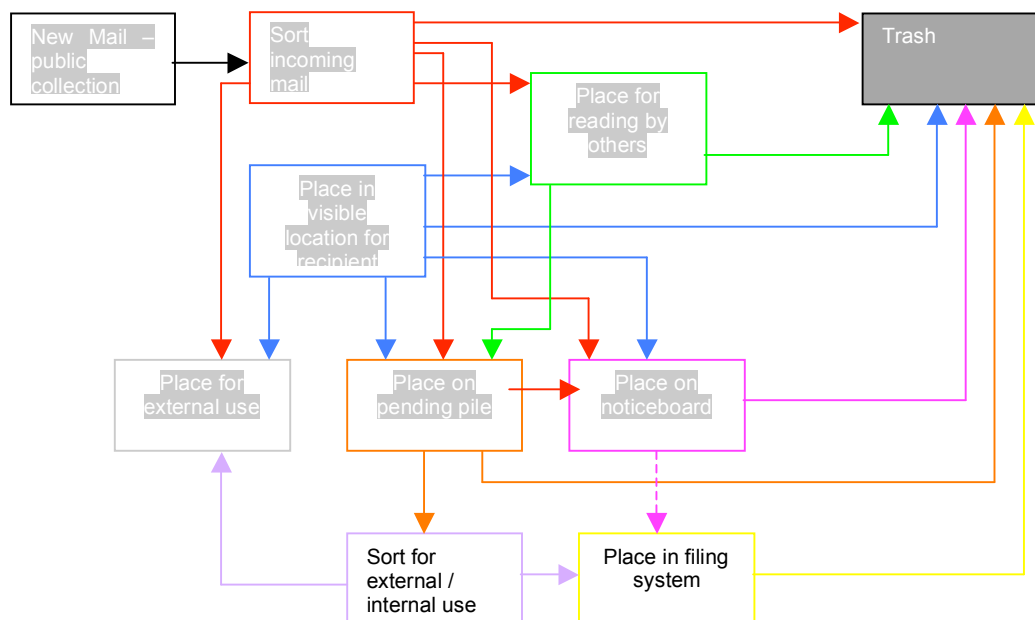


Figure 2. Schematic of the orderly character of mail-based communication and construction of coordinate displays

Projected arrangements of email utilising 3rd Generation mobile technologies promise to support recipient designed displays but, in being personally rather than geographically or ecologically situated, such displays inhibit accountability and the social monitoring of action statuses afforded by the construction of publicly visible coordinate displays. In short, existing and projected displays of electronic mail are inadequate when faced with deployment in the home and they are inadequate as they fail to appreciate and respond to the orderly ways in which mail-based communications enter home life and are practically managed therein.

It is not fair to say that designers are unaware of the spatial and temporal properties of mail use when it comes to the design of email applications. In one of the earliest studies of email use, Mackay [19] highlighted three essential functions

of mail use: information management, task management, and time management. The study made the point that these functions are essential features of mail-based communication and the spatially and temporally distributed construction of coordinate displays instructs us that the same applies to paper-based mail in the home. Attending to the temporal attributes of email use, Gwizdka [14] also observes that emails are used to organize people's external memories:

... they are "knowledge in the world" and, thus, they should be designed to reflect the actual life-cycle of information in different tasks.

Harper et al. [15] concur and elaborate the essential nature of the actual life-cycle in considering the implications of paper-based mail use for the design of electronic alternatives:

... a letter in the geography of the home is a marker of what point a job-to-do has reached. Email might support this if the screens are located in places that equate to locations within the domestic workflow.

The need to support workflow has already been recognised by researchers at Microsoft [32]. However, this line of research construes of the user's primary 'habitat' [8] as the existing computer interface and seeks to implement solutions through the design of more sophisticated applications that support workflow at that interface. As Duchenaud and Bellotti (ibid.) note,

Communication is a central part of organized work ... Thus, personal information management is embedded where it is most needed and accessible ... in the [the user's] habitat.

We have already seen in the use of paper-based mail that the home clearly consists of organized work in an ethnomethodological sense and with that we can also see that *where* information management is most needed is, *pace* Harper et al. [15], in the wider environment - in the habitat literally (*not* metaphorically, at the existing computer interface).

What we are suggesting is that the development of computer support for communication in domestic settings requires designers to move beyond the desktop and monolithic interface to consider the design of distributed networks of interfaces that may be situated in a variety of places within the physical environment of the home. Figure 2 elaborates the main elements of a distributed network of interfaces constructed by household members to handle their mail-based communications, for example. The network instructs us that workflow is *ecologically distributed* across the domestic space through the social construction of visible displays that reflect the current coordinates of a range of ongoing tasks to hand. Explication of the network raises the issue of developing a range of

ecologically distributed interfaces exploiting both static and mobile displays that may be situated in various contingent locations to support the spatial and temporal ordering of the flow of work in the home.

Conclusion

Current research has identified social communication as a primary area of technological development in the networked home of the future. In this paper we have explored the design space with respect to the development of email for home use. Previous ethnographic studies of mail use in the home have highlighted a mismatch between current technologies and the nature of mail-based communications in the home. Current technologies focus on elaborating support at the existing computer interface. The study presented here suggests that there is a distinct need for design to move beyond the desktop into the physical habitat.

Rather than concentrate on the existing interface, we have suggested that the design of communication technologies for domestic settings might usefully be informed through ethnographic investigation of the orderly ways in which household members currently construct interfaces to display their communications and coordinate their practical actions. In the case of developing email communication technologies, studies of the orderly character of paper-based mail use in the home elaborate a network of ecological distributed coordinate displays constructed by household members to organize domestic affairs. These coordinate displays highlight the need to support workflow and task management when designing communication technologies for the home through the development of networks of ecologically situated and mobile displays that support the visible and timely flow of information around the home.

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