

# Natural Communication and Mobile Communication in Context

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## **Abstract**

A comparison of natural communication, fixed telecommunication and mobile telecommunication is outlined in this report. The comparison is informed from field studies, where natural, fixed and mobile communication is studied in context. Our believe is that by investigating and understanding the use of different types of traditional and new communication media, we are better suited to develop improved telecommunication services.

## **Keywords**

Natural communication, fixed telecommunication, mobile telecommunication, context

## **Introduction**

The term “mobile communication” is nowadays very popular and used in newspapers, television and magazines. There is however no precise and universal definition of what mobile communication actually is. Mobile communication does indeed mean different things for different people. For a businessman it may refer to his mobile phone in the pocket or the car, and for a signal-processing engineer it may be associated with wireless communication.

We will in this report attempt to elucidate the concept of mobile communication, hopefully without introducing further confusion. Looking into and comparing the mobile telecommunication phenomenon with the “natural communication” phenomenon and “fixed telecommunication” phenomenon does this. The motivation is

to learn some lessons from the field of natural communication that may be relevant for the field of communication over distance with mobile communication technology.

We will start by looking into the pragmatics of natural communication, then move to fixed telecommunication. From these descriptions we will investigate some ideas that may be useful for the field of mobile communication. The examples that are used is taken from field studies conducted of various highly mobile and highly communication intensive operation, such as bike messenger operations, field police work and field engineering customer care work. The contextual inquiry method as described in (Holtzblatt and Beyer 1998) has been used during the field studies.

### **Natural communication**

What are the pragmatics of natural communication? And will our knowledge of those, support us to comprehend the field of mobile communication, in order to develop new and improved telecommunication services?

Communication is an intrinsic ability of all organisms, but organisms differ with regard to what they can convey and what they can perceive. Consequently there is a diversity of communication mechanisms in the natural world. It is not our goal to elaborate any radically new way of viewing natural communication, but simply describe some observations concerning the pragmatics of natural communication that may be used as a guiding background or horizon for the problems and opportunities that is seen in mobile communication solutions of today.

By natural communication in this discussion, we mean all communication between people that is mediated by the natural media, i.e. the ether, and that is done directly between people – without any man made artefacts as mediators in between. An example of natural communication is a conversation between two people that are situated in the same region.

The premise for this analysis is that face-to-face communication in a given region incorporates the most resources for communication. A region may be defined as any place that is bounded to some degree by barriers to perception. Regions vary, of course, in the degree to which they are bounded and according to the media of communication in which the barriers to perception occur. Thus thick glass panels, such as are found in broadcasting control rooms, can isolate a region aurally but not visually, while an office bounded by beaverboard partitions is closed in the opposite ways (Goffman 1971).

We focus on natural communication with these characteristics:

- All natural communication is done by *broadcasting* in a given region
- Natural communication is *non private*
- Natural communication is done with a different types of *media*
- Natural communication is done in *real time*

There is richness in natural communication that we do not find in any man made communication mechanism, where there are limited resources and constraints. We keep in mind that natural communication has evolved and developed over some million years (Hauser 1997).

Natural communication takes place in real environments, under real conditions, with no encoding into bits and bytes. In natural communication, there are two distinct phases that we will investigate. These two phases are the negotiation or establishment phase, and the exchange phase. In the next section, these two phases will be described, and we will do this with the example of a conversation between two people in a given region.

### **Negotiation and establishment of communication**

Before the exchange of information is under way, there is a negotiation phase in all natural communication in a given region. The initiating party, A, observes the addressed party's, B, context to see whether it is suitable to initiate a conversation.

In the negotiation phase, there is a continuous negotiation between A party and B party in progress, in which a decision is made of whether the parties are to engage in the communication, or whether it is to be postponed. Both A party and B party may, based upon information about the other parties context decide whether to engage in a conversation or not. If A party enters the region of party B and see that party B is busy, party A will for example decide that the communication is to be postponed or carried out. In the same way, B party may decide to proceed or to postpone a conversation with party A, based on information about for example identity of initiating party, subject, priority and so forth.

The negotiation phase includes feedback of information between the two parties, where A party get feedback from the context of the B party, and vice versa. In natural communication, subtle cues and hints between the parties often gracefully facilitates the negotiation phase. In our case study with field engineers, the negotiation phase is illustrated clearly in the triangle of field engineers, customers and machines. When a field engineer is entering a region with the customer and the machines, there is a distinct phase, where both the field engineers and the customer negotiate if the conversation about the faulty machine is to proceed.

### **Information exchange**

The next phase of natural communication, when the communication between A party and B party is established, is characterised by:

- The communicating parties share the same *contextual space*
- There is a *feedback mechanism* conveying contextual information back to the sending party

The fact that the two communicating parties are in the same region is essential. The region is characterised by the environmental information like the noise level, the temperature, if it is raining etc. The contextual space is here meant to describe both the environmental information and the general situation of the communicating parties (Suchman 1987).

The feedback mechanism is actively used by the communicating parties so as to manage the information exchange phase throughout the conversation. The feedback mechanisms is actively used for determining:

- If the information arrive
- If the receiver understand
- The reaction of the receiver

Based on the contextual feedback the parties may adjust communication by:

- Choosing another communication media, such as shift from voice to gestures, from audio to visual and so forth
- Choosing another modality, such as from audio by voice to audio by clapping hands
- Correct transmission error by repeating the same phrase louder
- Adjust the content by explaining in some other ways
- Change the subject according to the reaction of the other part who can agree, disagree, be angry, be sleepy or getting bored and so forth

One important point to note is that natural communication fits human being both psychological and physical and hence is the probably the best way that human beings may engage in communication with each other. After all, our capabilities have evolved over some time.

Throughout our field studies, we have witnessed the richness of the exchange phase, as seen for example by the bike police officers in communication with the general public. The exchange phase is carried out in varying contextual spaces, where all the mechanisms above are seen.

One of the limitations of natural communication is that it is confined to short distance. Short distance limitation is due to the laws of nature. In the next section, we will turn to fixed telecommunication, to see in which way this has enabled communication to be carried out over long distance, and at the same time altered some of the ways in which the establishment phase and the exchange phases is carried out compared with natural communication.

### **Fixed telecommunication**

Fixed telecommunication makes possible the extension of the distance between communicating parties, but introduces some side effects. When we compare natural communication with fixed telecommunication, we will see the following differences:

- The communicating parties are no longer in the same contextual space
- Limited or no contextual feedback except error detection and on the transmission level
- The establishment phase is not quite satisfactory although some screening services exist in fixed telecommunication

First concerning the different contextual spaces, the communicating parties' figure out the context of the other party, before engaging in communications. This can be done in a conscious way when the conversation is important, but also unconsciously and quite automatically. Since fixed telecommunication usually happens from a limited number of predictable and stable places such as homes and office locations, the adoption of the other parts local contextual space is easy to manage.

Concerning contextual feedback, the communicating parties often try to inform the other parties explicitly in the conversation such e.g. it is raining, I am tired, etc. This is done in the exchange phase, when the communication is established.

The establishment phase is done in a radically different way compared with natural communication. In fixed telecommunication, there are both services to inform B party about the identity of A party, and manual services to inform A party about the situation of the B party. These mechanisms work satisfactory because the users adapt themselves to the current limitations of communication technologies.

In the next section, we will shift over to mobile communication, and investigate what this introduces with respect to contextual space and the establishment phase in particular.

### **Mobile communication**

With the introduction of mobile communication services the communication parties can now literally be anywhere while communicating over distance. It is with mobile communication services however not possible to predict the whereabouts any more of the parties involved, and hence it is more difficult to predict the contextual space of the other party. When the user is moving out of predictable places like the office or the home, he is enveloped in an unpredictable contextual space.

Each communicating parties may now be in a contextual space where there is:

- *Environmentally* noise or darkness etc.
- The user is busy with *tasks or physical objects* at hand
- *Other people* that interfere with the communication in the region

There are radically different ways of planning and handling situations when working in an unpredictable contextual space that is observed when investigating mobile communication. In the case of field engineers working with physical objects, in dynamically changing environment, we have seen that the conditions for the possibility for engaging in mobile communication over distance change from minute to minute. When for example working in dark cellars, with physical objects, both the interaction modality and the communication media that is available with current mobile communication solutions makes it difficult to engage in communication over distance. The field studies has shown real problems, for real users with respect to the above mentioned issues of the environmental characteristics, the working with physical objects in the region, and with communication with other people in the region.

### **Discussion and conclusion**

Although the trends in telecommunications are to increase bandwidth and transmission bit rates, miniaturise communication devices, to integrate more applications and to support multimedia communications, we believe that contextual communication will play a decisive role for the success of new communication services.

With the analysis of comparing the pragmatics of natural communication with that of fixed telecommunication and mobile telecommunication, it is identified major challenges concerning solutions for communication over distance.

The main challenges are:

- Enable *contextual feedback* between communicating parties
- *User interaction* modality with the media at hand

- User selection of *communication media*

These three challenges are related to both the establishment phase and the exchange phase of communication over distance.

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