

**UNDERSTANDING THE MOBILE TELEPHONY USAGE
PATTERNS**

-The Rise of the Mobile Communication “*Dispositif*”-

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Abstract

The thesis focuses on the interlaced re-building of communication, movement, and information due to the integration of the wireless telephony in the daily life. The theoretical objective is to highlight the value of the *dispositif* concept for the study of the aforementioned process. This goal is supported by an explorative online study, conducted between 2002-2003 in Germany on 151 respondents between 13-65 years, that analyses the different behavioral patterns and attitudes among various groups of users, as well as non-users.

The core of the theoretical part of the dissertation consists in the construction of a *dispositif* model that explains wireless telephony constitution, usage, and impact. The model outlines technology, subjects, usage, perception, representation, and socio-cultural frames. The reciprocal interactions between the mobile telephony apparatus, human subjects (as designers and users), and various usage programs (mobile communication, information and orientation, personal assistant, supervising, and entertainment) lead to the rebuilding of communication, information, entertainment, and supervising “arrangements”. Further, in a historical chapter dealing with the constitution of the *dispositif*, avatars of communication and mobility structures are presented in connection with the underlying transformations from science to technical implementation and diffusion. I support the thesis that the current mobile telephony represents a mature and functional phase of a manifold *dispositif*, which has historically constituted through redefinition and creative rebuilding of programs and structures belonging to earlier avatars and competing *dispositives*.

The empirical part of the dissertation examines the results of the quantitative study conducted to validate and correct the theoretical model and to identify the formative effects of the *dispositif*. Findings indicate that the usage of wireless telephony creates a specific communication structure featuring particular purposes, content, situations, actions and partners, which is mainly oriented toward spatial and temporal coordination of communicators. The analysis also concentrates on the relation between mobile communication (verbal and written) and other communication forms enabled by face-to-face contacts or technical *dispositives*. Two positioning analyses of the existing communication forms in the situational and affective field (conducted through Multidimensional Scaling), show that the usage and perception of mobile telephony and SMS are subjects of interaction with the usage and perception of face-to-face communication, fixed telephony, and e-mail. Thus, concurrent and complementary *dispositives* continuously influence each other by ingeniously manipulating their programs for competitive purposes.

Concerning the constitution of communicative mobility, the effect of technology usage on movement is reinforced mainly at the attitudinal/representational level. Particular localization patterns and chronotypes structured by technology usage are revealed. Other results relate to the images and attitudes towards technology and its users and to several social effects of mobile telephony usage, such as the strengthening of close family relations and the extension of the network of acquaintances.

The last part of the thesis comprises study conclusions, methodological discussion, and suggestions for further research.

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1. INTRODUCTION

1.1 Argument

New telecommunication technologies have been developed in order to enhance the basis of establishing, maintaining and pursuing social relations. At the same time, a culturally produced pattern of mobility (Sørensen, 2001) tightly intertwines with the emerging communication and information structures. Communication, information, and mobility can be investigated together as coordinates of a new order that defines the information society. Particularly in the recent years, the need for mobile access to communication and to data services - anytime, anywhere - has become increasingly clear, and digital cellular telephony has seen rapid acceptance and growth. Mobile phones are rapidly improving and changing, being currently captivated by the promises of the wireless Internet. Driven by the growing demand of users to access information while on the go, the classical cell phone has turned into a combination of Personal Information Manager (PIM), mobile I. T. (information terminal) and entertainment platform, which can accomplish various tasks, such as; conversation, information, orientation, localization, agenda, m-business, supervising, entertainment etc.

It seems that the ultimate goal of the current wireless communication technologies - *people to be able to communicate with anyone, and to access information from everywhere at any time-points* towards a general reorganization of communication, information and mobility structures. This rebuilding process, initiated by the integration of the wireless telephony in the daily life, stays in the middle of the analysis in the thesis. Focus is placed on the comprehension of user's behavior and relationship with the handled technology. Crucial issues include how mobile communication and information and communicative mobility develop and function and how they influence the communicators. How and how much do people telecommunicate while moving and move while telecommunicating, and how do the intertwined telecommunication/movement practices change the way they live, interact, and work? Does the increased use of mobile phones (together with the wireless Internet) and personal communication systems (PCS's) radically change the ways that people talk to each other, search for and use information, travel, and perceive the space and time while performing these tasks?

As can be observed, the majority of these research questions refer to the impact of mobile telephony usage on two intertwined structures: *mobile communication* and *communicative mobility*. *Mobile communication* defines a specific communication structure encountered in cell phone conversation, comprising: specific purposes; exchanged contents; communicative actions and situations (the context); partners and their interaction. Each of them is specific and different from the ones of the other concurrent media because it is influenced by the possibility of changing places while communicating and by other internal structural facilities and constraints of the wireless technology. Reversing the word order, *communicative/informative mobility* in wireless technology usage points towards a type of movement behavior encountered when someone moves while communicating and/or accessing information. His/her movement either derives from a previous communication or information action, or it is oriented towards the fulfillment of a specific communicational/informational purpose, or just serves the urge to communicate at the expense of other thoughts, senses or actions. The emphasis is here more on the exploitation of

space while using the cell phone, travel patterns, communication places, orientation, temporal and spatial perceptions.

The main objective of the thesis is to explain the constitution and functioning of mobile communication and information and communicative mobility, as a result of the interaction between the inner structure of the technology, human subjects and the general cultural, social and economical conditions of our time. The concept of *dispositif* is employed for these objectives, and a *dispositif* model is constructed, depicting the relationship among technology, human subjects, usage programs and general social and cultural frames.

1.2. Objectives. Research Questions and Expected Outcomes/Hypotheses

The dissertation aims to accomplish the following objectives:

Construct a dispositif model to explain wireless telephony usage and its effects

Analyze the historical constitution of the dispositif

Explore how technology usage re-builds:

- *Mobile communication (communication and information patterns, content, occasions, places, partners)*
- *Communicative mobility (amount of travel, distances, places associated with mobile communication)*
- *Perception of space and time in mobile communication*
- *Interpersonal contacts*
- *Imagery of technology and its users*

The following research questions derive from the above objectives:

General: *Does wireless communication technology usage lead to a structure re-build of communication, information and movement? How is this possible?*

The general thesis of the dissertation is that mobile communication technology usage, through the intertwining of technical and socio-cultural elements and frames in the *dispositif*, leads to a structure re-build of *mobile communication* and *communicative mobility*.

Specific: *How does the mobile communication and information dispositif develop and function?*

It is claimed that the current mobile telephony represents a mature and functional phase of a manifold *dispositif*, which historically constituted through redefinition and creative re-building of programs and structures belonging to earlier avatar *dispositives* and competing *dispositives*

How do users employ the technology to communicate to each other? Are there any structural changes in the usage of the concurrent communication media?

A particular type of communication is expected to take place among mobile phone users, in terms of content, purposes, partners, affective reactions. This communicative structure can interact with other competitive structures, tending to absorb "communicative areas" belonging to "face-to-face" communication or to other technology-mediated kinds of communication.

What type of communicative mobility (mobility, localization) appears with technology usage? How are space and time perceived while mobile communicating? Is there a specific temporal pattern (chronotype) associated with technology usage?

The hypothesis is that *communicative mobility* is constructed by the management of near and distant travel through verbal and Internet applications of mobile telephony and by the interaction of the public space with particular calling specific for mobile communication. It is expected that wireless telephony usage structures the perception and experience of space and time, inducing sensations of proximity, fluidization of movement, spatial disruption; immediacy and time compression.

What type of social interaction manifests with wireless telephony usage?

It is expected that mobile telephony structures social interaction by enabling the maintenance of social networks, the reinforcement of close family or partner ties, and elongation of peripheral relationships.

1.3. Importance of the Study - Theoretical and Methodological Coordinates

The importance of study mainly derives from the very importance of the technology itself, because wireless telephony represents one of the most attractive and rapidly expanding technologies of our time.

From the theoretical point of view, the current dissertation reinforces the value of the *dispositif* concept for Science and Technology Studies. Being equally distant from strong technological reductionism and strong voluntarism, the thesis claims that mobile communication technology represents a material *dispositif* that structures the communication, information, and mobility structures, but it is influenced by social and cultural changes and the imprevisible creativity of human subjects at its turn. A *dispositif* model aims to explain both shaping of the wireless telephony and structural effects of its usage on communication, information, and movement. This model depicts the diagram of relations among three main elements: the apparatus, human subjects and usage programs (mobile communication; information and orientation; personal assistant; supervising; and entertainment) on specific perceptive and socio-cultural backgrounds. A potential strength of the dissertation could be its interdisciplinarity, given that it integrates into its main paradigm ideas from Science and Technology Studies, history of technology, media theory, and social psychology.

From the methodological point of view, the thesis analyses, besides the main qualitative and quantitative studies in this field, the results of an own quantitative study designed on realistic basis, that took into consideration various cost, time, and representativity constraints. The exploratory online study was imagined as a variant of a *post-factum experiment in natural environment* (case-control study), the target population being constituted from users and non-users of mobile phone between 13-65 years. Various communication and mobility patterns have been explored in terms of technology usage. It should be recognized that, in spite of the theoretical considerations about technology consequences on information, communication, mobility and movement, the empirical study could not examine the implications of late developments like the mobile Internet, MMS (Multimedia Services), entertainment applications or GPS (Global Positioning System) because these were scarcely used at that time (2001-2002). By contrast, mobile communication, both verbal and written, featured a

rather long history of heavy usage, and it was correspondingly domesticated into the daily life.

1.4. The Structure of the Dissertation

The thesis is conceived in five parts. The first three sections (**1. Introduction, 2. Framing Wireless Communication Technology.-The Analysis of the Communication, Information and Movement Re-build, and 3. In-depth Exploration of the Mobile Communication *Dispositif*: Basic Structures and Mechanisms**) progressively construct the theoretical core of the work. These chapters focus on the application of the *dispositif* concept to the study of the mobile telephony development and usage. The central objective in these chapters is to construct a model that explains both constitution and formative effects of wireless telephony. Ideas from sociology, communication studies, social psychology, and history of technology are integrated in an interdisciplinary frame. The next two sections (**4. An Empirical Approach to the Wireless Communication *Dispositif*, 5. Conclusions**) contain the results of the explorative quantitative study conducted to validate the theoretical model. These analyze the intertwining of technology with various facets of communication and spatial and temporal behavior.

2. FRAMING WIRELESS COMMUNICATION TECHNOLOGY – THE ANALYSIS OF COMMUNICATION, INFORMATION AND MOVEMENT STRUCTURE RE- BUILD

2.1. General Perspectives and Controversies in Science and Technology Studies

It is generally agreed that the effects of telecommunication and information technologies are controversial issues. On the one hand, some technological determinist theories maintain that technology is the cause of social change, creating new forms of sociability and shaping the individuals. On the other hand, voluntarism stances are opposed to determinism, stressing “free agency, individual will, conscious deliberation and choice. Voluntarists insist that people are active agents and not helpless automatons; they are always able to make deliberate choices and to exercise control over change” (Chandler, 1995, p. 12). In this line of thought, the adepts of structuration theories in Science and Technology Studies consider technology an effect of pre-existing social demands. As in the case of technological determinism, various degrees of social determinism can be identified.

Many theoretical views reinforcing the structuring powers of communication technologies seem to involve some degree of technological determinism, ranging from the *strong* to the *mild* perspectives. As Chandler stresses, the most extreme form of technological determinism sees the entire form of society: “as being determined by technology: new technologies transform society at every level, including institutions, social interaction and individuals. At the least a wide range of social and cultural phenomena are seen as shaped by technology. 'Human factors' and social arrangements are seen as secondary.” (Chandler, 1995, p. 3).

A "strong" perspective is that of Marshall McLuhan, who advocated the existence of intrinsic effects of media consisting in shaping and controlling “the scale and form of human association and action” (McLuhan, 1964, p. 8). Authors like Jack Goody (1987) and Walter Ong (1987) formulated similar radical claims of major “cognitive consequences of technology” (Chandler, 1995, p.12). For example, Ong put the spoken word to the basis of deep human relations, revealing the importance of voice communication in the formation of true communities of men, groups of individuals constituted by shared awareness. (Ong, 1987). Technologies based on transmission of voice like fixed or mobile telephony would have such strong effects in this vision. Neil Postman's argument is not (as McLuhan claimed) that the media we use change people's cognitive structures, but rather that they change the structure of discourse by encouraging certain uses of the intellect, by favouring specific definitions of intelligence and wisdom, and by demanding a certain kind of content. He also presents technology as non-neutral, containing an ideological bias (Postman, 1993, p. 16, quoted in Chandler, 2000, p. 9). Hard accents characterize also the substantive theory of technology (best known through Ellul and Heidegger) that claims that technology constitutes a new type of cultural system that restructures the entire social world as an object of control.¹

¹ “Heidegger, Habermas and Albert Borgmann attributed a substantive (more than instrumental) content to technical mediation. According to these theories, technology is not neutral. The tools we use shape our way of life in modern societies where technology has become all pervasive. In this situation, means and ends cannot be

The reductionism; reification; autonomy; technology animism; universalism; and techno-evolutionism have to face strong critics when approaching social phenomena, mainly because it is difficult to isolate a single cause for a social process and to prove that this is the primary determinant (Chandler, 1995, p. 4). Other theories have consequently adopted a moderate deal of technological determinism. The mild (or soft) technological determinism, more widely accepted, claims that “the presence of a particular communication technology is an *enabling* or *facilitating* factor leading to *potential opportunities* which may or may not be taken up in particular societies or periods (or that its *absence* is a *constraint*)“ (Finnegan 1988, p. 38, quoted in Chandler, 1995, p 12).

Conversely, other authors have adopted the stance of social or cultural determinism, meaning that technologies and techniques are determined by social and political factors. The strong socio-cultural determinism represents a type of reductionism, which sees technology as reflecting a single rationality - for example, an economical or political imperative of a ruling elite.

However, a more moderate and widespread position is that technology is socially conditioned but not entirely socially determined (Benthall 1976, pp. 146-147, quoted in Chandler, 1995, p. 12). Some authors have gone beyond simplistic forms of social determinism and looked for explanations that are more flexible. In particular, the main focus of the Social Construction of Technology (Social Shaping of Technology) is placed on the comprehension of the links between social and technical processes, understood as human and social constructions. In this view, technology is “shaped” by human engineers, market forces, consumer needs and demands and various individuals and groups as social products. Most interestingly, the theory focuses on the internal structure of the technology and tries to identify the social context in which the technological details acquire a particular meaning. The comprehension of the social change stands among the most important accomplishments of the Social Shaping of Technology. This is seen as “probabilistic”, neither simply rational and goal directed, nor purely spontaneous, but contingent on a variety of factors including structural constraints.²

This assumption brings flexibility in interpretation. According to Robin Williams and David Edge (1996), central to the theory of the Social Shaping of Technology (SST) is the idea that:

„...there are ‘choices’ (though not necessarily conscious choices) inherent in both the design of individual artifacts and systems, and in the direction or trajectory of innovation programs. If technology does not emerge from the unfolding of a predetermined logic or a single determinant, then innovation is a 'garden of forking paths'. Different routes are available, potentially leading to different technological outcomes. Significantly, these choices could have differing implications for society and for particular social groups. The character of technologies, as well as their social implications, are problematised and opened up for enquiry. We can analyze the social influences over the particular technological routes taken (and their consequences).” (Williams, Edge, 1996, pp. 866-867)

Social Shaping of Technology differentiates from other extreme constructivist views like SCOT (Social Construction of Technology), by the fact that this doesn't reject the role of non-

separated. How we do things determines who and what we are. Technological development transforms what it is to be human." in Andrew Feenberg, *From Essentialism to Constructivism: Philosophy of Technology at the Crossroads*, online at: <http://www-rohan.sdsu.edu/faculty/feenberg/talk4.html>, 20.04.2001.

² In “*The Social Construction Of Technology*”, available online on: <http://www.umsl.edu/~rkeel/280/soconstr.html>.

social factors in technological change. Technology may have a built-in, intrinsic effect or value, but this is usually dependent upon a particular social context. (Brey, 1997, p.1). A whole range of studies has been conducted within this thinking frame. Boudourides (2002) has synthesized some of them, with application to information and communication technologies:

“In particular, the stage of product development was seen as a discursive communicative processes (Hymes, 1972; Sacks et al. 1974; Schegloff, 1992, 2000); the stage of adoption was considered to be prevailed by social network dynamics (Valente, 1995); the stage of use or consumption was described by transcription (Callon, 1986; Latour, 1987), representation (Akrich, 1995), configuration (Woolgar, 1991) and it was socially situated in domestic settings or appropriated in the workplace (Sørensen & Berg, 1991; Silverstone & Hirsch, 1992; Cawson *et al.*, 1995; Mansell & Silverstone, 1996). Such a full range of technological adjustments, from user configuration and appropriation to resistance and reconstitution constituted what André Vitalis and Thierry Vedel call ‘*socio-politique des usages*’ (Vitalis, 1994; Vedel, 1994; Chambat, 1994), Bryan Pfaffenberger calls *a technological drama* (1992a, b) and Andrew Feenberg (1999) identifies with a process of “*democratic rationalization*” of technology” (Boudourides, 2002, p. 4).

The theoretical perspective in this thesis tries to establish a balance between technical determinist and social determinist positions. The concept of *dispositif* can bring an important contribution to the reformulation of “the old and recurrent questions about the status of technical objects, usage and appropriation of tools, the relationships human-machines, up to the complex cooperative activities that allow the consideration of situational contexts constructed by the interaction of ergonomical, cognitive, anthropological and social dimensions”³. The use of this concept comes close to newer orientations in Social Shaping of Technology, according to which social, communicational and behavioral consequences are built into technologies (Akrich, 1992; Latour, 1992; MacKenzie and Wajcman, 1985, quoted in Brey, 1997). In this way, the black box of technology is opened to show how even the very design of technology (and the artifacts themselves) may embody important social assumptions. Technology is no longer separated from society as the former theories of technology- as- cause or technology-as-effect considered; it is, instead, an intrinsic part of it.

In my research, I fall back particularly on Hicethier’s and Lenk’s media *dispositives* models in an attempt to avoid both technological determinism and extreme voluntarism when dealing with technology constitution and its effects. The broad *dispositif* model constructed in the thesis frames technology, individuality and society in a flexible way. The continuous interaction among technical frames (the mobile apparatus), human subjects (as designers and users) and various programs (scripts, programs in ANT termini), on specific perceptive and socio-cultural backgrounds, leads to the constitution of specific communication, information, entertainment and supervising structures or arrangements. According to the model, technology is socially shaped by the interactions between users and engineers concretized in programs and by the general social, economical and cultural constraints. However, one cannot speak of a simple social structuration, because technology, as a fact, through a structured offer of applications and a certain type of spatial networking and temporal partition, has the power to condition further human reactions and social spheres at its turn. This is the combined structural effect of the *dispositif* on human behaviors and overall society and culture, exerted through its internal “dispositions” or “arrangements”.

³ In editorial HERMÈS n° 25/1999 *Le dispositif. Entre usage et concept*.

2.2. Advantages of the *Dispositif* Approach

2.2.1. Definition and Examples

Daily actions, like watching TV, surfing the Internet, talking on mobile phones, chatting, playing video games take place within "arranged" environments, i.e. within "*dispositives*". Made popular mainly by Foucault's theses, the term "*dispositif*" is becoming increasingly popular in the most diverse fields of social sciences: "perception *dispositif*", "*dispositif* for communication", "*dispositif* of mediation of knowledge", "*dispositif* of education", "cinematographic *dispositif*", or "media *dispositif*". In its original accept, the concept falls back on the the French word "*le dispositif*", derived from the Latin radical "*dispositum*", supin of "*disponere*" (*dis* + *ponere*, i.e. "to place while distinctly separating" or "to arrange, order, regulate"). One can distinguish *dispositives* from systems thanks to etymology: the Greek *systēma* describes a grouping, an "assembly" or a "whole" in only one body which is held upright (*sista* = "to be upright"), while "*disponere*" describes the separation or the distribution of the various elements, each one in a kind of strategy. In sum, the *dispositif* is built starting from discrete elements inter-connected in a diagram of interactions⁴.

A *dispositif* should not be regarded as a simple totality of mechanisms or techniques, but as an arrangement ("*la disposition*") of various elements, which has formative power itself. To quote Foucault, the *dispositif* is:

"Un ensemble résolument hétérogène, comportant des discours, des institutions, des aménagements architecturaux, des décisions réglementaires, des lois, des mesures administratives, des énoncés scientifiques, des propositions philosophiques, morales, philanthropiques, bref : du dit, aussi bien que du non-dit. Le *dispositif* lui-même, c'est le réseau qu'on peut établir entre ces éléments."(Foucault, 1977b, p. 299)

From Foucault's definition, it can be noticed that the concept represents a sum of relations among diverse elements (architectural, legal, technological, etc), which regularly produce in the social body a certain effect on words, bodies, or thought/knowledge. In Foucault's analysis, this effect is either oriented towards normality (sexuality) or anormality (madness) (Potte-Bonneville, 2003).

The concept of "*dispositif*" differs from the concept of a frozen structure in the fact that there are human subjects who produce its arrangements and make it function (Potte-Bonneville, 2003):

"Mais – et c'est essentiel – le «dispositif» n'est pas une structure: il faut bien que des gens l'aient 'disposé', voulu, conçu, aménagé; il faut que des gens le fassent fonctionner. En ce sens, la notion ne fait pas seulement glisser le politique du volontaire vers l'anonyme, d'un point de vue 'macro-politique'; elle restitue, au plan micro-politique, la possibilité de désigner des acteurs là où nous croyions voir des pièces de machine. Elle s'oppose à la fois à la pensée du complot et à celle du système (...) Dispositif: une distribution d'ensemble, mais des méchancetés singulières; une compréhension donc, mais un doigt pointé. Une stratégie sans stratégie, mais des stratégies qu'aucune stratégie ne saurait exempter"(Potte-Bonneville, 2003, online citation).

⁴ Further clarifications in *Marelle*, from Douglas Edric Stanley, WWW document] URL <http://www.labart.univ-paris8.fr/ifi/cadre.htm>, 22.05.2001.

At this point, it seems that the concept suffers an internal contradiction: how can a strategy without strategists and the importance of human arrangements be accommodated? Foucault's solution is that the *dispositif* gives birth to: a) a program which aims to cope with reality and b) a reality rarely similar with the program. These divergent tendencies are nevertheless productive, because they lead to adjustments and arrangements (Potte-Bonneville, 2003).

Gerard Leblanc's comparison of the notions of medium and *dispositif* is useful to characterize the *dispositif* in relation to other reputable concepts in media and communication studies. He argued that the current popularity of the concept derived at least as much from the weight of institutional arrangements that govern the production of representations and their appropriation, as it did from the growing technicisation of our daily environment. He emphasized the fact that no medium is by nature reducible to established institutional *dispositives*, because it may contain a plurality of virtual *dispositives*, many of them not activated yet. (Leblanc, 1999, online citation)

The flexibility of the *dispositif* concept has made it attractive for media and communication research⁵ and science and technology studies. In particular, the beginnings of the usage of the concept in the field of communication and media studies are characterized by the shift from the former focus on media products (films) to the structure of their apparatusive production (Paech, 1997, p. 400). As Paech further explained, a clear proof of this conceptual shift was provided by Baudry's analysis of the cinema *dispositif* as a descriptive category in the theory of the media, for the viewing situation at the cinema:

“Zwischen objektiver Realität (dem Außen des Cinema und Zuschauersubjekt) vermittelt ein kinematographischer Produktionsprozeß, der im Zuschauer die Wiederholung des äußeren Realen als inneren Realitätseindruck oder dessen Wiedererkennen als ideologischen Effekt zur Folge hat” (Paech, 1997, p 401).

Three factors are made responsible for this effect: the construction of optical projection devices using the mathematical model of the XIVth century perspective (in arts), the construction of the psychic after the model of optical devices, and the disappearing of all difference structures between representation and reception. Apparative techniques and conditions were attributed a strong ideological dimension:

“Der kinematographische Apparat ist ein strikt ideologischer Apparat, er verbreitet vor allem bürgerliche Ideologie, ...die Ideologie, die von diesen Bewusstseins-Apparaten produziert wird, ist bisher nicht gedacht worden“ (Paech, 1997, p. 403).

In his article *Überlegungen zum Dispositiv als Theorie medialer Topik* (1997), Paech also strongly advocated the necessity of a further conceptual development from *apparatus* to *dispositif*: Two main advantages of the latter concept were highlighted: firstly, it has a stronger explanatory capacity, due to the inclusion of social and cultural arrangements; and, secondly, the emphasis is placed on “spatial media arrangements”, the so-called “*mediale Topik*”:

“Die apparative Dimension stellt technisch apparative Dispositionen innerhalb eines *Dispositifs* bereit; andere derartige Dispositionen betreffen die kulturelle, soziale etc. (...) Selbstverständlich handelt es sich dabei nicht um kontingente Ereignisse sondern um

⁵ Alan Flageul identified in France a “Golden Age” of the concept between 1969-1983, but remarked that the concept is still fashionable among media analysts and professionals.

Dispositiv Strukturen innerhalb eines Dynamischen Systems das unter dem Aspekt medialer Topik, also einer räumlichen medialen Anordnung, Dispositiv heißt“ (Paech, 1997, p. 403).

As mentioned before, Baudry was one of the first who thought that processes of media production and reception could be better understood within the *dispositif* frame. In 1970 he employed the concept for a better comprehension of the cinema production and reception⁶. Two important concepts for the understanding of the viewing situation were produced within this conceptual frame: the concept of "primary identification" and the concept of "impression of reality" (Zajc, 1999, p. 12). Primary identification means that people first identify with the mechanism of representation in order to identify with the characters on the screen (secondary identification). As a consequence, the impression of reality in the cinema derives from the position of the spectator and the cinema simulates the condition of the subject rather than simulating reality. More specifically, the "material" *dispositif* of cinema arranges its elements: the apparatus, the space and the screen (light fascicle) + (factor of constraint) + (subtraction from the neighbourhood) + (reflective surface) + (surface of reception) so that all these dispositions and impressions can be reconstructed. It can be said that Baudry's conceptualization of the viewing situation has revealed one important advantage of the concept of *dispositif* for the purposes of the thesis—that communication technology should be conceived within its usage as a situation, a setting, locational and relational at the same time, constituting and including the subject (Zajc, 1999, p. 14). The constituted subject is an imaginary subject position, a simulated point of view, which one must take in order to recognize representations and shared by all spectators, while the included subject is the individual, the concrete living person, and every cinema-goer to whom the *dispositif* assigns a distinct place within the setting (Zajc, 1999, p.13).

In France, the potential of the concept made it attractive for many studies in the media and communication field. For instance, Poitou defined a cognitive *dispositif* as follows: "des unités cognitives composées nécessairement d'agents munis de leur outillage" (Poitou, 1999, online citation). An interesting attempt to analyze both concepts of communication and *dispositif* through the encyclopedic model of meaning belongs to Jean-Pierre Meunier. He concluded that, although at the highest level of semantics, the concepts appear to be independent; careful examination of cases where the *dispositif* has been introduced into theoretical explanations of communication reveals the existence of a relation of co-determination between concepts, because the main components of the communication flow highlighted by the various communication theories: transmission, relation and cognition depend largely on the technical device in which communication relationships take place and vice-versa (Meunier, 1999, online citation). In the same conceptual line, Philip Bert, in *Internet as an Heterotypic Device*, started from Michel Foucault's concept of *dispositif* in terms of power and focused on the subjective relationship we experiment in regards to *dispositives*, based on playing and illusion. He looked at the concept of *dispositif* at the light of various conceptions: the tactical uses of technology developed by Michel de Certeau, Winnecott's transitional objects, and heterotopy, all of which being conceptions that lead to the consideration of *dispositives* as texts with productive potential (Bert, 1999, online citation). A specific analysis of the structuring effects of the digital *dispositives* was conducted

⁶ "Damit der Mechanismus der Kontinuität seine Rolle als ideologische Maschine spielen kann, muss eine weitere Ergänzungsoperation hinzugefügt werden, die durch eine besonderes *Dispositif* vorbereitet wird. Es geht um die Identifikation des – Zuschauers durch seine spezifische Anordnung in der Höhle des Kinos zum Spiegel der Leinwand: Die Disposition der verschiedenen Elemente, der Projektor, der dunkle Saal, die Leinwand rekonstruiert das für die Auslösung der von Lacan entdeckten Spiegelphase notwendige *Dispositif*" (Baudry, p.403).

by Jean Luis Weissberg in *Belief Device*. Starting from the research question whether digital media shape patterns of belief, and whether cultural and technical aspects of the topic can be related with the concept of the “*dispositif*”, he studied the interaction between technique and culture in the making of these “*dispositives*” that construct new forms of creed (Weissberg, 1999, online citation).

In Germany, the concept used was slightly retarded as compared to the French approach, which did not impair upon its explanatory capacity but produced some other unexpected effects in the comprehension of the concept and in the direction of its usage. As Hickethier observed, although Foucault’s theory of the *dispositif* proved to be rather difficult to implement *per. se.*, in the various media studies, his ideas were creatively transformed and adapted. The most important and productive aspect of the theory, argued Hickethier, consisted in its ability to obtain explanations of media production and reception from the relationship between very heterogeneous elements like:

„...die Vernetzung von Gesetzen, Richtlinien und Medienkonzepten, von Institutionsaspekten, Technik, Ökonomie, Formen und Inhalten der Sendungen miteinander und mit Wahrnehmungsphänomenen, Rezeption, Nutzungs- und Wirkungserfahrungen. Diese Aspekte in einen engen Zusammenhang zu bringen, war Ziel einer Medientheorie und Mediengeschichtsschreibung Anfang der neunziger Jahre, die damit die sektorale Zuwendung zu einzelnen Bereichen (Kommunikator- vs. Rezeptionsforschung) innerhalb der Theorie und der Geschichtsschreibung überwinden wollte.“⁷

The concept has been successfully introduced in the German media studies by Knut Hickethier⁸ (concerning the analysis of the TV reception), and by Siegfried Zielinski, Joachim Paech and Karl Sierek (concerning cinema reception). In “*Apparat - Dispositif - Programm. Skizze einer Programmtheorie am Beispiel des Fernsehens*” (1991), Hickethier pointed out the complexity of the mass media *dispositif* reflected in the multidimensionality of its apparatus and programmes, and in its wide social assumptions. The mass media *dispositif* is more complex than the *dispositives* aligned to adjustment and storage (camera, typewriter, grammophon) because it covers and integrates multiple *dispositives*: the technical quotation of pictures, writing, and noises. In his opinion, mass media electronic *dispositives* are socially embedded. Also, Carsten Lenk outlined in his book: *Die Erscheinung des Rundfunks* (1997) the general lines of his research on radio history, carried out with the concept of *dispositif*:

"Die vorherrschende Untersuchungsperspektive dieser Arbeit ist nutzerbezogen, also lebenswertig orientiert, so problematisch es, schon aufgrund der quellenlage-Scheinen mag, der Integrationsprozeß des Rundfunks, seine Habitualisierung in Umgang und Nutzung , aus der Sicht der Hörerinnen und Hörer zu beschreiben." (Lenk, 1997, p. 20).

⁷ In Hickethier, Knut, *Das Mediendispositiv oder eine Theorie des Mediensubjektes*, Tiefenscharfe Online

<http://www.sign-lang.uni-hamburg.de/Medienzentrum/zmm-news/Sose0102/0102Art9.htm>

⁸ „Als der Dispositiv-Begriff in Deutschland erstmals auf das Fernsehen angewendet wurde, ging es darum, für die systematische Erforschung der Fernsehgeschichte (im Rahmen des Sonderforschungsbereichs 'Bildschirmmedien') einen alle Aspekte der Entwicklung verbindenden Theorierahmen zu gewinnen. Das Konzept wurde auf einer Tagung der Historischen Kommission der ARD vorgestellt (vgl. Hickethier 1991a,b) und stand in der Folgezeit in einer gewissen Rivalität zu einem Konzept einer Programmtheorie und -geschichte, zu einer sozialwissenschaftlichen institutionsorientierten Fernsehtheorie usf. Vorher und gleichzeitig haben Siegfried Zielinski, Joachim Paech, Karl Sierek u. a. den Begriff für die Kintotheorie nutzbar gemacht.“ (Hickethier, 2002, online citation, id.).

The *dispositif* approach proves to be also valuable for the historical analysis of technology implementation in daily life:

"Die Entscheidung, wie ein Medium etabliert und umgesetzt wird, so konstatierte Knut Hickethier ist letztlich abhängig ' von einem Zusammenspiel von Apparateanordnung und Zuschauerpositionierung, von Organisationsform der Produktion von Sendungen und Ihrer Ausstrahlung, von Erwartungsformulierungen und dem Bild, das von einer technischen Erfindung als ein neues Medium entsteht'. Jenem Zusammenspiel, das im Begriff des Dispositivs zusammengefasst ist, versucht diese Studie nachzuspüren."(Lenk, 1997, p. 21)

Other examples of *dispositif* stances can be given. However, I think that the aforementioned positions have clarified the nature of the concept, revealing its advantages for the present study. The concept is flexible and broad enough to allow the intertwining, the simultaneous thinking of technology and society, sociability and individuality, because the emphasis is put on how individuals use technology in their daily lives in order to cope with an ever-changing reality. This could explain how communication, movement, and perception of space and time are organized in the wireless *dispositif*. Also, the historical approach of the changes in the communication/movement structures becomes highly interesting from this perspective: given that the *dispositif* for communication is historically changeable, the history of communication media can be approached as a history of transformations in communication and information *dispositives*.

2.2.2. The Model of the Wireless Telephony *Dispositif*

The *dispositif* of wireless technology aims to cope with the intertwined communication and mobility needs brought forth by the information society. The integrated global network (Castells, 1996) with its *space of flows* and *culture of virtuality*, characterized by timeless time and placeless space, presents the human subjects challenges to which they need to adapt. In this context, wireless communication technology usage best promotes *mobile communication* and *communicative* mobility as main "coping" strategies. Mobile telephony and its latest developments can serve as means of constructing various impressions of direct communication, immediacy, ubiquity and proximity in communication, while providing as much information as possible so that people should be able to successfully organize their daily interconnected lives from various changing places.

Following Hickethier, Carsten Lenk (1997) has defined the main elements of a radio *dispositif*: apparatus; program; human subjects; and reception backgrounds:

"Anders als im 'klassischen Kommunikationsmodellen aus Sender, Botschaft und Empfänger', in dem es mit Hilfe der Apparatur Kommunizierende gibt, steht im Mittelpunkt der dispositiven Anordnung das Konstrukt einer Mensch-Maschine Relation. (referring to the radio *dispositif*)... Genaugenommen handelt es sich um ein trianguläres Verhältnis von Programm, Apparat und Subjekt vor dem Hintergrund eines spezifischen rezeptiven Rahmens" (Lenk, 1997, p. 22).

The aforementioned elements are relevant for the construction of a *dispositif* model to explain mobile telephony constitution and usage, too. Let's first look at this radio *dispositif* model (Lenk, 1997) and operate some transpositions:

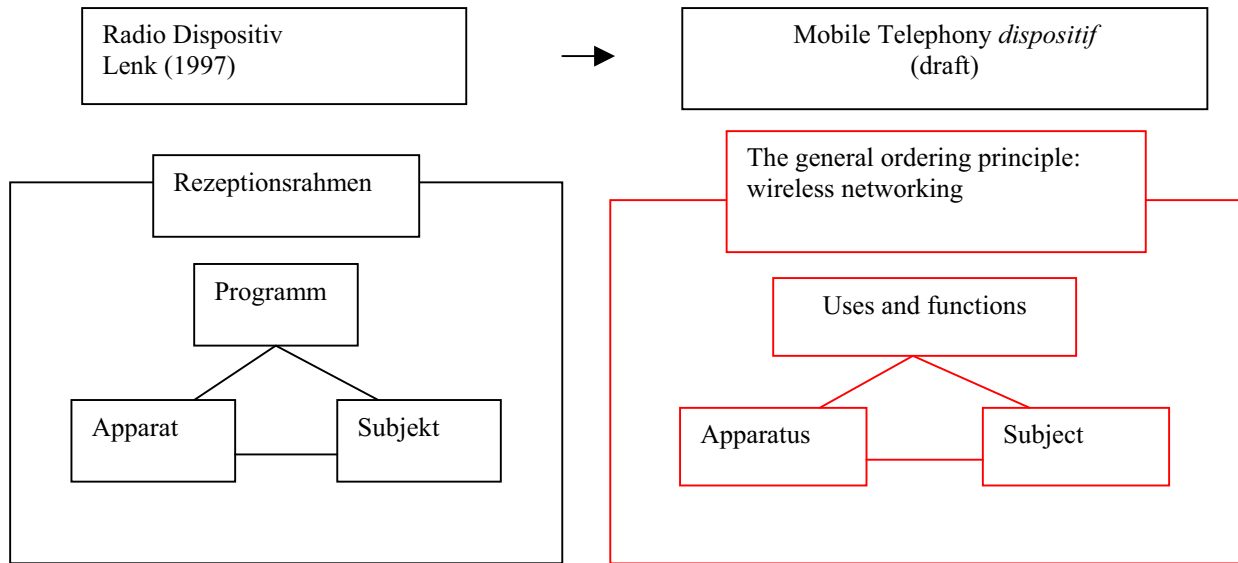


Figure 1. Main elements of the *dispositif* (draft)

The previous scheme constitutes the basis for the further development of the model for wireless telephony.

PROGRAMS AND FRAMES OF THE WIRELESS COMMUNICATION *DISPOSITIF*

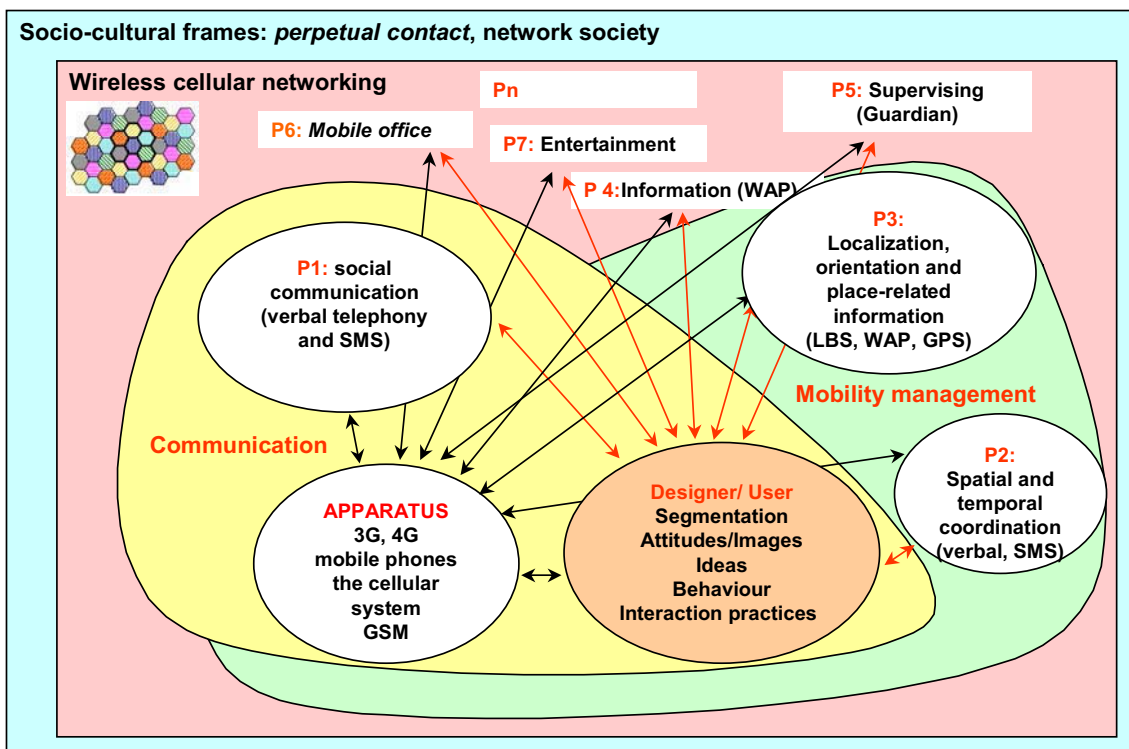


Figure 2. The model of the wireless *dispositif*

Social frames are placed on the basis of any interaction technology humans. They include institutions, regulation; types of social networking; discourses, ideologies; and

communication culture. Decisive for defining mobile telephony shaping and usage are the networked society (Castells, 1996), the rule of perpetual contact (Katz, Aakhus, 2002) and the flexibilization of work and private spheres. The second ordering frame - the wireless networking - releases the usage from the strong spatial and temporal dependence and influences all the other further components of the *dispositif*. On these main backgrounds, three types of main elements interact. They are: the **human subject** as designer and user, the **apparatus** (the technical architecture, devices, and applications) and the **programs**. There are interdependences among *dispositif* elements (also cf. Lenk, 1997). For instance, the interaction between the subject and the apparatus involves the user's body as well as the mobile set. Using the technology is primarily an interaction of the subject with the apparatus and the programs. Also, the apparatus sets limits on the transmission of spoken words, icons (photos), and text (SMS).

The apparatus represents the material core of the *dispositif*. As claimed above, the handset itself and the architecture of the technology filter only specific types of interaction and communication. As for the technical architecture, this allows users to move while communicating with one another. Figure 6 shows a basic cellular system, which consists of mobile phones, base stations and a mobile switching center. Each mobile phone communicates with the other phone via the base station and the mobile switching center, using two radio frequency channels: one for transmitting and one for receiving. So, both phone users may constantly transmit, while simultaneously receiving signals from one another.

Cellular systems accommodate a large number of users over a large geographic area, within a limited frequency spectrum. This high capacity is achieved by limiting the coverage of each base station transmitter to a small geographic area, called a **cell**. Thus, the same radio channels may be reused in non-adjacent cells, increasing the number of potential users. It should be added that the base stations and the control switching centers make mobile communication possible by regulating the passage from cell to cell and ensuring the continuity of the communication while users are on the way. The technical capacity of these devices to communicate with each other extends to a so-called "coverage area", which represents, together with the cells, the topological boundaries of the communication process (thus having structuring effects). The cellular architecture helps structure the number of potential users (and actually increase it by a relocation of signal bandwidths).

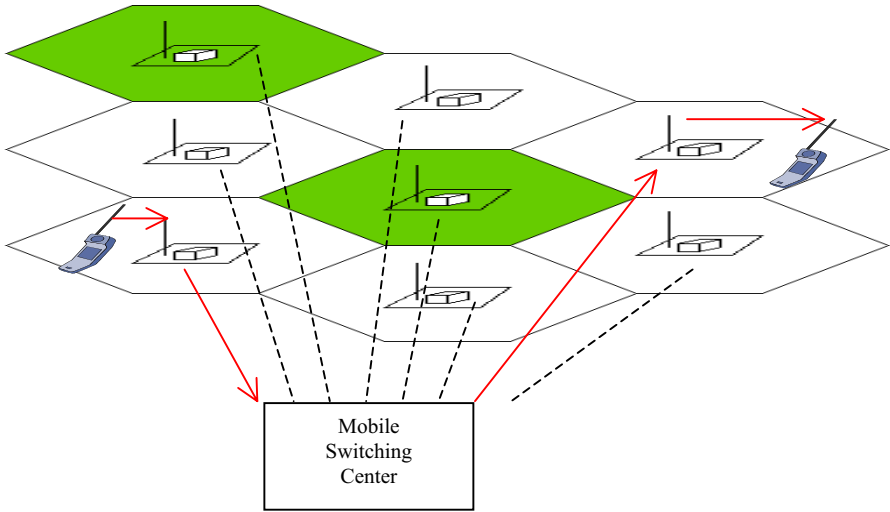


Figure 3. The technical architecture of the wireless networking in mobile telephony

Concerning the **channel**⁹ (radio waves), the radio-band is very narrow; therefore, a large transmission of data is still limited¹⁰. Communication and data access are thus constrained to remain at the level of "short talk" or "brief information exchange". There are also some concerns about the effects of cell-phone radiation on the health of individuals, a fact that influences the amount of communication and the selection of its place or partners. The storage medium¹¹ (storage center of voice-email, SMS messages, numbers, etc.) provides users with means to keep in touch with unreachable people or stay reachable. Yet, its capacity is rather small and, therefore, unsatisfactory for some users (only 3 minutes in some cases). Up to the present, the restitution mediums (the screen, the loudspeaker) have only allowed audio communication and some written text exchange, resulting in a communication without visual cues (videophones have not been mass implemented yet). That the small screen allows only limited scrolling and is difficult to read impairs information access. However, new ways of visual information transmission are fast developing.

The **programs** are particularly important in the *dispositif* approach, because they describe the circular action that allows this scheme to avoid the dangers of both technical and social determinism. First, humans as both designers and users build the inner structure of the apparatus. Then, the shaped technology presents, at its turn, a range of limited possibilities of the apparatus from which users select the applications necessary to fulfill their needs. Thus, the social embedded technology provides the menu from which various "technological meals" (the *programs*) are served. However, digesting these meals induces change; from now on, humans are technically conditioned in their further reactions and wishes.

New-generation wireless communication mobile phones (third generation – 3G) offer considerably higher data rates and allow significantly increased flexibility. They can provide a wide variety of services, ranging from voice and paging services to interactive multimedia, including teleconferencing and the Internet¹². The most recent wireless *dispositif* includes, therefore, a broad "menu" of functions and applications defining various usage programs, such as: social communication from places of choice (through cell phone conversation and SMS, e-mail over the mobile phone, teleconferencing); localization, orientation and place-related information (through LBS, WAP, GPS), spatial and temporal coordination (through verbal telephony, SMS); data access through the Internet (WAP: Information and Transactional Services, Fax); mobile office (PDA functions: calendar, notebook, calculator); supervising (through Guardian services); entertainment (games, video, music, broadcasting); and gadgets (colours, forms). The list is not exhaustive, and new technology developments can significantly enlarge it.

⁹ In telecommunications in general, a channel is a separate path through which signals can flow, cf <http://whatis.techtarget.com>, 22.04.2002.

¹⁰ Cell phones have not achieved ubiquitous coverage yet. They have a pretty good coverage for voice communication, but if a reliable Internet access is desired, the air interface will need to support higher data transfer rates. (few th. Kbps). Most cell phones and web-enabled PDA's have data transfer rates of 14,4 Kbps or less. (This is very little compared to a 56 Kbps modem or cable connection). Moreover, most web pages are full of graphics that would take a long time to download at 14,4 Kbps. For that reason, the preferred mode in wireless is still the text instead of graphics.

¹¹ A storage medium is "any technology (including devices and materials) used to place, keep, and retrieve data on a long-term basis. A medium is an element used in communicating a message; on a storage medium, the "messages" - in the form of data - are suspended for use when needed." <http://whatis.techtarget.com>, 22.04.2002.

¹² Nevertheless, the number of facilities is much larger: phone directory, clock, calculator, games, personalized/custom sound, appointment/reminder calendar, incoming number storage, automatic redial, last number recall, mute/hold button, one touch dialing/speed dialing, vibrate mode, lock alarm, call forwarding, multiparty calls, email/text messaging, browser, wireless internet, PDA, MP3 player, GPS receiver.

The existence of a **subject frame** within the *dispositif* raises interesting questions about users' and designers' segmentation, attitudes/images, and interaction practices. A debate concerning the status of the subject within the *dispositif* has recently begun in the German research area. As Helmut Hickethier mentioned:

“Jan Hans konstatierte in der deutschsprachigen Rezeption des von Michel Foucault u. a. entwickelten Dispositiv-Begriffs innerhalb der Medienwissenschaft eine Verkürzung auf die Vorstellung einer räumlichen Anordnung von Zuschauer und Technik, die zu einem „sozialgeschichtlich orientierten Deskriptionsprogramm“ und damit einer Entledigung von dem „lästigen Subjekt-Problem“ (Hans, 2001: 26) geführt habe.” (Hickethier, 2003)¹³.

Hickethier complained that the *dispositif* concept of Baudry, Foucault referred to a manipulative structuration of the individual perceptions and, consequently, he reinforced the power of the subject to select its paths and uses. I agree with his idea that humans as users and creators are not hermetically structured by the technology and that they are not prisoners of the *dispositif arrangements*. In users' case, their differential usage mainly evolves from the gratifications they extract from it, so that it is of high importance to understand the cultural practices; habitualization; routinization; domestication and ritualization of the medium usage. (Hickethier, 2003). The human subject can prove to be unpredictable and change the way that the elements of the *dispositif* produce communication, information and mobility structures. Even after the apparatus takes a particular form, according to designer' programs, various creative strategies of users can be highlighted that further re-shape the technology and lead to new applications and devices: the strategies of communication and mobility the user chooses; accessibility management; the creative situational and temporal management; the exploitation of the public space and its privatization; the coordinative/expressive use of the technology; and the creation of new communicative spaces or uses.

The interaction among the apparatus, the programs and the human designer/user lead to the constitution of several usage structures in the *dispositif*. For instance, the program of social and expressive conversation through verbal telephony and SMS stays at the basis of the *mobile communication* frame. Its main dimensions are: the exchanged contents, the purposes, communicative actions and situations (the context), partners and their interaction. The programs of spatio-temporal coordination, information access through the wireless Internet and the use of Location-based services build the *informational/ communicative mobility*. This usage structure defines the employment of the technology to exploit the space/time and to coordinate subjects' movements: travel patterns; communication places; orientation; and temporal and spatial perceptions. Music and games programs construct a promising *entertainment frame*. Also, other programs (not identified at the time when the study was conducted), such as supervising or remote health monitoring, stay at the basis of specific usage structures with potential in the future.

Through the accomplishment of its programs, the *dispositif* has structuring effects on how human subjects as engineers and users construct the content of communication or selectively access information; interact with others; exploit the space and time; and perceive themselves. In particular, users' and non-users' attitudes towards technology and its human target construct a specific image of the "cell phone communicator or information handler" and of "mobile telephony", which confirms the fact that that a transformed "technology creator" and "mobile user" emerges from the interaction with technology.

¹³ In Knut Hickethier, *Das Mediendispositiv oder eine Theorie des Mediensubjektes*, in Tiefenscharfe Online, available from <http://www.sign-lang.uni-hamburg.de/Medienzentrum/zmm-news/Sose0102/0102Art9.htm>.

It should be added that the model is dynamic. The interplay between the social and cultural settings; knowledge; social necessities; telecommunication companies; institutions; market requirements and preferences; consumer habits and attitudes; policies and regulations combines with the engineers creativity and intentionality to launch the apparatus in its ephemeral form. This has a certain structure which proposes to the users a specific way of usage. Further, users may comply with the “inscribed” suggestion by selecting one or more of functions and applications, thus accessing the pre-set usage programs or can invent new arrangements of applications, thus defining new programs. As it can be noticed, when mobile telephony comes into mass-usage and integrates in the daily life, the subject frame already contains the seeds of a qualitative change in the *dispositif*. Every modification of it further reflects in the general social frame: new social needs; new company strategies and regulation with corresponding modified apparatus, functions and uses. The spiral motion continues: the apparatus starts producing functions and uses - the core of newly adjusted programs that set the user within a new usage frame and so on. The structures of communication, information, and mobility produced by the *dispositif* are thus in a continuous re-building process.

In sum, the *dispositif* model of mobile telephony depicts the diagram of relations among three main elements: apparatus, human subjects and programs on a specific socio-cultural background. Due to the different nature of the various programs, several sub-*dispositives* may be extracted from the general model: these for mobile communication, information and orientation, personal assistant, supervising, and entertainment. Understood as a *dispositif*, wireless telephony has structuring effects on the subjects’ perception and representation of reality; control and exploitation of the surrounding space, time management; and communicative practices.

The relevance of the *dispositif* approach presented in this chapter may be revealed from a comparison with existing theories and models. Positions from Social Shaping of Technology, Actor-Network theory or technological systems have to be considered. The common goal of the theory of the *dispositif* and the Social Shaping of Technology is the stress on the avoidance of a black box approach to the technology “to allow the socio-economic patterns embedded in both the content of technologies and the processes of innovation to be exposed and analysed” (MacKenzie und Wajcman, 1985, Bijker und Law, 1992). The idea of alternative innovative usage "choices" and interpretive flexibility is also enclosed in the work into the selective way of developing user programs in the wireless telephony *dispositif*. In addition, the general social frameworks of the *dispositif* contain mechanisms, regulations, and discourses, which affect the interactions of human subjects with the technology. This view is in conformity with some directions in the SST, according to which " “technologies are not neutral, but are fostered by groups to preserve or alter social relations” (Hård, 1993). However the social dimension of the model should be reinforced in future research conducted on the macro level. The present work focuses more on individual (communicative psychological) consequences of the technology usage.

The Actor Network Theory and the Technological Systems - interesting extensions of the constructivist perspective - offer anchors to other concepts and valuable problematization. The Actor-Network theory places a higher emphasis on the questioning of technical objects. For instance, Michel Callon, in “*Society in the Making: the Study of Technology as a Tool for Sociological Analysis*” (1987), considered that “an actor network is simultaneously an actor whose activity is networking heterogenous elements and a network that is able to redefine and transform what is made of” (Callon, 1987). Both human and non-human elements are included in this concept, which is able to continuously refine its identity and relations. Bruno

Latour questioned the category of objectivity and subjectivity in usage as well, observing that the objects we manipulate can be regarded as “actants” in the “social life tissue”¹⁴. The two actor-network theorists, Callon and Latour, although coming from different backgrounds, extended their analysis of social networks of actors in innovation to include actants, that are “humans not in a position to shape the network's development, as well as non-human actors, such as microbes, scallops, electrons, integrated circuits and their physical properties” (Williams, Edge, 1996). Between ANT and the approach in the current work, there are similarities and differences. The goal of the ANT is the description of a symmetrical society of human and non-human actants, which are attached to a network directed toward a common purpose. In addition, this theory describes the corresponding development of a product. The purpose of the *dispositif* is to describe personal and social consequences of product development and usage, which translate in the change of some social and behavior pattern/structures. The category script/programs in the ANT can be compared with the programs of the *dispositif*. According to Philip Brey:

“In technological design, design constituencies inscribe a vision of the world into their designs. Designs consequently embody a script: they harbor expectations about the characteristics of users, social relations, the use environment, and so forth, and stimulate or even demand conformity to this vision. Studying the process of inscription and the resulting script of an artifact enables the analyst to reveal how designs exclude certain groups, or work against their interests in other ways” (Brey, 1997, online citation).

In the *dispositif* model, however, the emphasis is more on the contribution of both user and designer programs to the constitution of particular usage frames than on the detailed anatomy of the inscription/description processes. There is also no exact similarity between the internal *dispositif* interactions and the term actor-network as an arrangement of human and non-human actant interests.

A methodological similarity between ANT and the *dispositif* approach can be noticed: both analyze first the technical offer (inscriptions/prescriptions in ANT) and then empirically examine the actants. Nevertheless, the empirical analysis of the *dispositif* is oriented toward the structural effects on human behavior structures rather than to the qualitative description of the arrangements.

Finally, the theoretical model of “*Appartageistes*” developed by Katz and Aakhus (2002) aims to explain especially the nature of mobile telephony usage. This theory tries to exceed the barriers of some extreme approaches of the structuration theory through the stress laid on the symbolic character of the technology usage and by the postulation of a certain *Apparatusgeist*, which describes: “The common set of strategies or principles or reasoning about technology evident in the identifiable, consistent and generalized patterns of technological advancement throughout history” (Katz & Aakhus, 2002, p. 307). The theory describes the conditions which support the drive toward perpetual contact, concerning the obvious and hidden reasoning on technology and social relations. Punctual research confirms the appropriateness of the theory. Despite its pertinent conclusions over perpetual contacts, the theory insufficiently explains the constitution of the technology and their structural consequences. Nevertheless, the logic of perpetual contact is employed in our model to describe a specific “*disposition*” of the networked information society.

¹⁴ In „Le dispositif. Entre usage et concept”, in *Hermes* no. 25/1999, available online on http://www.wolton.cnrs.fr/hermes/b_25gb_presentation.htm.

In conclusion, in relation to the mentioned background theories, the advantages of the presented model for Science and Technology Studies are:

- The model serves both for the explanation the internal technique emergence and the structural effects of their use
- It advances a flexible, flexible and integrable explanatory frame
- It has analytical potential
- It can be easily operationalised
- It avoids the dangers of the strictly technological and social determinism and the black box" approach.

The following chapter will analyze the progressive constitution of the elements and frames of the *dispositif*. The thesis continues with an exploration of the main frame of the *dispositif* and its arrangements that structure mobile communication and communicative mobility.

2.3. Learning from the Past - a Socio-Historical Approach of the *Dispositif* “Ripening”

2.3.1. Perspectives and Controversies in the History of Media and Information Technologies

In *Informatisierung, Formalisierung und kapitalistische Produktionsweise* (1996), Rudi Schmiede questioned the fact that the “new information and communication” technologies are still called new. In his opinion, this word emphasizes their still “*unentwickelten, in seiner Entwicklungsrichtung und in seiner Wirkungen oft schwer bestimmbaren Charakter*” (Schmiede, 1996, p. 16). Indeed, mobile communication technology presents itself as a “new” mixture of various communication and information technologies. Its historical development, from telegraphy to fixed telephony and further to mobile telephony and wearable computers, depicts a succession of conversions which mirror transformations of human communication and information practices: from unidirectional message transmission (opera broadcast, transmission of orders in the army etc.) to bi-directional communication; data transfer; multimedia; agenda etc.

The starting point of the present historical analysis is represented by the astonishingly rapid diffusion of mobile phones over the last decade, after a very long period of latency. Interesting is that, in the process of their adoption and domestication, mobile phones have not simply replaced other communication media, but have challenged and interpreted them, thus providing users with supplementary or alternative features, which has spurred specific technicised communication; information; mobility and entertainment behaviors. I support the thesis that the current mobile telephony represents a mature and functional phase of a manifold *dispositif*, which has been historically constituted through redefinition and creative re-building of programs and structures belonging to earlier avatar¹⁵ *dispositives* and competing *dispositives*.

Which is the most appropriate strategy to explain these transformations from the point of view of the history of technology? It should be recognized that any historical approach to the constitution of telecommunication technologies features a considerable complexity, so that

¹⁵ By avatar I understand a variant phase or version of a continuing basic entity.

studies in this field range from general theories generating large explanatory models to case studies enlightening for the general theme. The first category of studies attempts to explain the evolution of technology, either searching for the meaningful phases or trends or investigating the underlying factors inducing changes. Within the systemic paradigm, an important perspective is that of Hughes (*Evolution of Large Technological Systems*, 1987). The author mainly focused on the historical development of technological systems which contain: “messy, complex, problem-solving components. They are both socially constructed and socially shaping.” (Hughes, 1987, p.51) Technological systems enclose artifacts, organizations and institutions; they are generally goal-oriented, and evolve over time. Hughes’ theory paid special attention to the development patterns of these systems:

“Large, modern technological systems seem to evolve in accordance with a loosely defined pattern (...) I also use a number of interrelated concepts to describe the pattern of evolution. The concept of reverse salient, for instance, can be appreciated only if it is related to the concept of system used in this chapter. The concept of technological style should be related to the concept of technology transfer. The term pattern is preferable to “model” because a pattern is a metaphor suggesting looseness and a tendency to become unraveled.”(Hughes, 1987, p. 56).

Further, he specified the non-sequential phases and activities of the development:

“The history of evolving, or expanding, systems can be presented in phases in which the activity named predominates: invention, development, innovation, transfer, and growth, competition, and consolidation. As systems mature, they acquire style and momentum.” (Hughes, 1987, p. 56).

Interestingly, Hughes believed in the existence of a discernible pattern in the ordering of the phases, despite the overlapping and backtracking of the phases. The concept of system builder is also important for the further ordering of the phases:

“During invention and development inventor-entrepreneurs solve critical problems; during innovation, competition, and growth manager-entrepreneurs make crucial decisions; and during consolidation and rationalization financier-entrepreneurs and consulting engineers, especially those with political influence, often solve the critical problems associated with growth and momentum” (Hughes, 1987, p. 57).

Particularly important for the purposes of the thesis is Hughes’ definition of the momentum phase¹⁶, because this work maintains that the current mobile telephony represents a structuring - forming momentum for social communication and mutual spatio-temporal coordination of communicators.

Referring to the history of communication technologies, Patrice Flichy (1991, rom. transl 1999), conducted in his study, *Une histoire de la communication moderne. Espace public et vie privée*, a historical analysis of the communication emerging from the continuous interplay between technology and society. He presented how communication alternatively oscillated between private and public spheres. At the beginning of the XIXth century, communication was successively public, then commercial, and later familial (from the end of the XIXth

¹⁶ Hughes considered that: “Technological systems, even after prolonged growth and consolidation, do not become autonomous, they acquire momentum. They have a mass of technical and organizational components; they possess direction and goals; and they display a rate of growth suggesting velocity”. (Hughes, 1989, p.76)

century until the beginning of the XXth century). In the second half of the XXth century, this slid into both economical and private spheres in the form of global communication. In an attempt to surpass the drawbacks of the techno-centrist and sociocentrist orientations, Flichy focused on the interaction between technology and society and its effects on communication. The genesis of the various systems of communication (the optical semaphore, the electrical telegraph, the photography, the phonograph, the telephone, the radio etc.) was thus correlated with the main mutations in both technology and society. Also, Brian Winston (*Media Technology and Society: a History*, Routledge 1998) performed an in-depth analysis of how society and media technologies interact, with an emphasis on the invention processes. His main idea is that the development of new media forms, from the telegraph and the telephone to computers, satellites, and virtual reality is influenced by the play-off between social necessity and suppression. In the German area, Friedrich Kittler singled out in his article: *The History of Communication Media* (1996) the decoupling of information and communication that occurred with the transition from writing to the technical media. What he named “an evolutionary” process gave the possibility of dividing the history of communication media into two main blocks: the first block deals with the history of writing (divided into a section of scripts and prints); the second one copes with the technical media, beginning with the basic invention of telegraphy via the analog media to finally the digital medium of the computer. Concerning the telephone, Kittler emphasized that: “in the guise of secondary orality, the telephone, in its progress from the direct dialing system via multiplex to satellite links, has made possible the non-hierarchical networking firstly of cities and ultimately of the global village” (Kittler, 1996, p. 8).

Another type of study focused more on changes in cultural practices that accompanied technological transformations than on the identification of stages in the evolution of technology. In close connection with the purposes of the thesis, Rammert’s reconstruction of the genesis of telephony is particularly useful to understand the close relationship between with the metamorphoses in communication culture and the invention, introduction and adoption of this technology. In *Technik aus soziologischer Perspektive. Forschungsstand - Theorieansätze - Fallbeispiele. Ein Überblick* (1993), the author maintained that the genesis of telephone technology represented a gradual two-staged process. The first stage (beginning with the patent of the telephone in 1876) corresponded to the nature of scientists’ ideal to simulate life through artificial organ construction. The main objective of the inventors was to develop ideas and devices, which would simulate the human hearing and speaking (Rammert, 1993, p. 233-235). The second stage was consistent with a socio-cultural innovation in telecommunication: the phone usage “*orientiert sich an unterschiedlichen kulturellen Visionen und Konzepten seiner Nutzung*” (Rammert, 1993, p.235). Three different cultural concepts related to phone communication were presented and analyzed: the transport concept (“*das Transportkonzept*”), the radio concept (“*das Radiokonzept*”), and the communication concept (“*das Verständigungskonzept*”). Rammert considered that telephone conversation was the best characterized by the communication concept (“*das Verständigungskonzept*”), which implies: “*direktes Gespräch zwischen Personen bei örtlichen Abwesenheit, Gleichzeitigkeit und Wechselseitigkeit des Sprechens, die freie Wahl des Kommunikationspartners*“ (Rammert, 1993, p. 238). In addition, he pointed out that diffusion of phone technology represented a medium institutionalization of a technical practice strongly influenced by the style of local communicative culture. This hypothesis was proved through a comparison made between telephony ownership and usage in four countries - USA; Great Britain; Germany; and France - between 1978-1921. The relatively slow diffusion of the telephony in France was explained through the dominance of a cultural model of monologue

communication¹⁷. In Germany (between years 1978-1921), the adoption of the technology was hindered by an authoritarian communication style¹⁸, but the modernization of the daily life changed the communicative culture (status ranks were replaced by pragmatic relations and informal communication won over formality), so that telephony usage increased. In Great Britain, face-to-face communication was still preferred in official situations, because visual cues of a partner's status were considered of highly importance. Moreover, any intrusion in public sphere was strongly disliked. In contrast to these "close" communicative cultures, the American one was more open and pragmatic, probably being influenced by pioneers' ideals of rapidity and efficiency. Applied to mobile telephony, Rammert's perspective might reveal the existence of a communicative culture of perpetual contact and availability emerging from the requirements of network society.

Other important studies dealing with communicative culture of telephone communication are included in *Mensch Telefon-aspekte telefonischer Kommunikation* (Museumstiftung Post und Telekommunikation, Braus, Heidelberg, 2000), in which Margret Baumann, Klaus Beyrer, and Helmut Gold explored the various socio-cultural aspects of the act of telephoning. Finally, the "technological style" approach can be useful to explain the different paths of cellular technology development in various countries, despite the global economy and the tendencies to unify technical standards. Another important contribution to the comprehension of importance of cultural differences in technology with application to the creation of congruent technologies has been brought by Mikael Hård and Andreas Knie (1999), who suggested that "congruent technologies are created through processes similar to those that lead to the creation of official languages and grammars." By connecting artifacts and nationality, the concept of the technological style was applied for analyzing differences between German and French Diesel Engineering.

Outside the German area, *America Calling. A Social History of the Telephone* (1992) by Claude Fischer constitutes an important work dealing with the social history of the telephone. Adjacent to its intrinsic value for the field of social history, this study is also methodologically interesting, because it is based on the analysis of telephone ads; oral histories; telephone industry correspondence; and statistical data. The objective pursued by the author comes closer to the purposes of the thesis, because he aimed to explain how, when and why Americans started communicating in a radically new manner. Important analysis themes in his work are: the social impact of the telephone usage (to what degree did people use telephones for conversation and for sustaining social relations?) and personal meanings of telephone calls (how Americans in the first half of the twentieth century used the telephone and what personal meanings it had for them). An interesting observation is that "surveys done in the last three decades suggest that people today most often telephone from home for social or vaguely personal reasons rather than for practical matters" (Fischer, 1992, p. 223). Mobile telephony may prove to be entirely different in this matter, as it highly promotes the micro- and hyper-coordination of the daily life (cf. Ling, 2002). Fischer's study, conducted in three California communities, revealed some social effects of telephone usage, which may also apply to mobile telephony usage: the extension of the network of social relations and the maintenance of the community life.

¹⁷ „In Frankreich pflegten die besseren Schichten eine exclusive Kulture der Konversation in den Salons. In der öffentlichen Sphäre überlebte das kulturelle Leitmodell der monologische Kommunikation von oben nach unten.“ (Rammert, 1993, p. 198)

¹⁸ „Hierarchie und statusbetonte Haltungen begünstigen Ein-Weg Medien, wie schriftliche Anweisungen, Briefe, Botendienste, Telegraphie“, (Rammert, 1993, p. 199).

⁵ Cf. Ling, 2002.

All in all, it can be said that each of the orientations presented before could help enlightening various aspects of the constitution of the mobile communication technology and its usage. The study of technology genesis and the staging of its development is necessary to identify the crucial events that pushed technology forward and increased diffusion, thus leading to the consolidation of elements and frames in the *dispositif*. Also, the historical analysis of cultural and social changes is highly important for the comprehension of communication and movement structures in mobile telephony usage. Therefore, both types of approach can be integrated in the *dispositif* model, which provides a reliable research framework for both constitution of apparatuses and technology domestication.

2.3.2. The Constitution of the Wireless Telephony *Dispositif*

The *dispositif* concept examined in the previous chapter has analytic potentials, not only because it is able to incorporate interconnected elements, but also because it can highlight historically and culturally established arrangements, which result from this re-building process. The genesis of the *dispositif* of wireless communication emphasizes the creative interpretation and transformation of structures and programs of other communication and information *dispositives* and *dipositif* avatars with a separate subsequent evolution. The decisive novelty is the association of each of these elements with mobility. We are dealing with mobile communication, mobile information, mobile supervising, and mobile entertainment.

2.3.2.1. Early and present source *dispositives*. Avatar¹⁹ wireless *dispositives*

The history of media *dispositives* can best be studied in periods that constitute “*breaks, beginnings or endings*” of linear historiographic narratives” (Hickethier 1992, p. 27)²⁰. The current wireless technology as a precursor of a new medium which will integrate telephony, messaging, radio, computing, television and publishing came into life through a succession of transformations in devices and technical architectures, which accompanied various “breaks” in knowledge, social frames, communication paradigms, and usage patterns. In the analysis of the historical constitution of the *dispositif* enabled by technology, focus should be placed on how all these elements: scientific competence; technical performance and society, cooperate in rendering workable communicative and behavioral structures, namely mobile communication and communicative mobility as main “arrangements” of coping with reality.

As presented at the beginning of this chapter, it is claimed that the current mobile telephony represents a mature and functional phase of a manifold *dispositif*, which has historically constituted through redefinition and creative re-building of programs and structures belonging to earlier avatar *dispositives* and competing *dispositives*. More detailed, mobile telephony historically emerges (and converges) from four main ancestors: telegraphy, telephony, radio, and computing. These constitute early resource-*dispositives* for communication and information in mobile telephony.

The starting point in the constitution of the **mobile communication *dispositif*** is represented by the invention of the wireless transmission of voice through radio waves. Several moments of stabilization of *avatar dispositives* around some developments of apparatuses and social

¹⁹ By avatar, I understand a variant phase or version of a continuing basic entity.

²⁰ Knut Hickethier, Kommunikationsgeschichte: *Geschichte der Mediendispositive*, in: Medien & Zeit, Jg. 7, Heft 2 (1992): 26-28. also compared to Paech (1997, p. 411).

and cultural frames can be emphasized: the wireless transmission of voice through radio communication, and the constitution of the technicised communicative mobility, brought forth by the implementation of the cellular architecture. Unfortunately, none of the earlier developments before the digital *dispositif* can be regarded as a true momentum for mobile communication and information. Rather, they may be considered a constellation of conditions for the crystallization of a given element or frame in the present digital *dispositif*. Present resource and competing *dispositives* for communication, information, mobility, management and entertainment include: the Internet e-mail and messaging, photography, and television.



Figure 1. Milestones of *dispositif* constitution

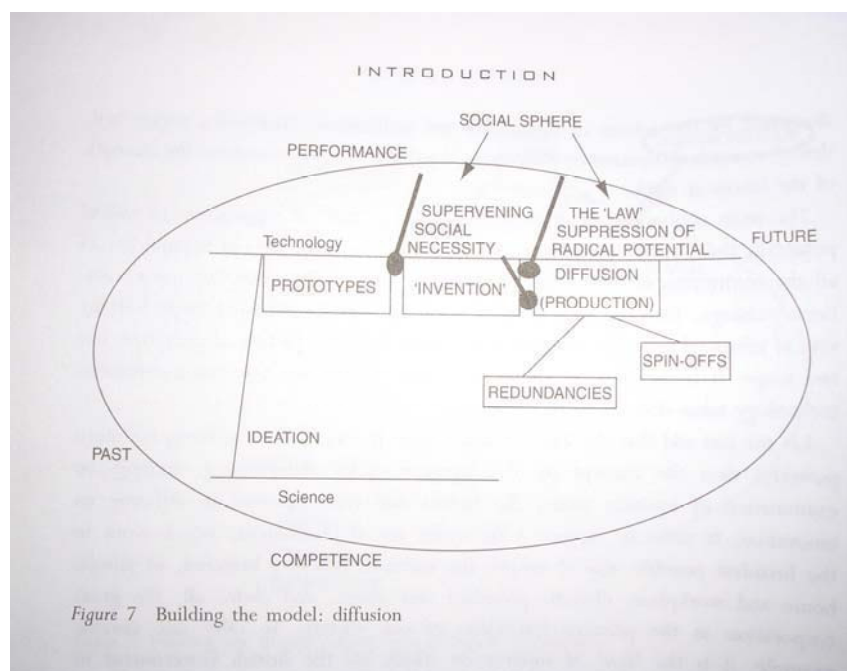
Let's begin with the examination of the apparative changes, before proceeding to the detailed analysis of the transformations in *dispositives*.

One striking feature of wireless technology is that it seems to be always innovative. From time to time, important changes in science, devices, uses, and image led to the launching of an always "new" technology. Starting from Brian Winston's historical model of change and development of communication media (1998), it will be shown how the elements and frames of the *dispositif* have developed and started to build a stable relationship, so that, in the end, a consistent mobile communicative and informative behavior has been able to manifest. Winston's model describes the passage from the scientific to the technological ground that leads to the introduction of a new communication/information technology.

The first transformation in the model is represented by *ideation*, by which technology moves from the ground of scientific competence up to the level of technological performance

(Winston 1998, p.5). The second transformation consists in testing scientific solutions by building diverse prototypes²¹.

The supervening social necessity emerges as the main reason why some prototypes are abandoned and others not, being thus decisive for the transformation of a prototype into invention. However, the author argued that the action of a supervening necessity did not account for the entire development and reception of a technology, but it rather consisted in transforming the circumstances in which the technologist created fertile ground for innovation. Further, inventions may lead to production, spin-offs (that are extensions of an invention, such as the video game), and redundant technologies - such as laser videodisks - those that are made irrelevant by a competing invention. Winston recognized that production is the least problematic of these three, because the acceptance of the device is, to a certain extent guaranteed by the operation of the supervening necessity. Therefore, in the majority of studies focus was placed on the symptomatic study of diffusion at both the macro and micro levels, with the result that the most scholarly literature available went in favor of production and marketing (Winston, 1998).



Source: Brian Winston: Media, Technology and society. A history from the Telegraph to the Internet (1998), p.114

Figure 2: Winton's model of technology development (1998)

²¹ "In prototype construction, one should consider the influence of the social sphere, the supervening social necessity being the main factor that transforms a prototype into invention (prototypes moved from lab to the mass market). In the course of the development, the device can be modified, extended or refined and alternative solutions can appear as rival technologies. Such developments can, themselves, be rejected or accepted. If they are accepted and further diffused, they constitute *spin-offs*, i.e. products of technological performance synchronous or subsequent to the original device's diffusion. If they are rejected, they are redundancies, suffering the same fate as partial prototypes." (Winston, 1998, p. 13). Winston also performs an interesting classification of possible prototypes in rejected, accepted, parallel and partial prototypes.

In spite of its accomplishments, Winston’s approach can be criticized on some points. First, although he promised to focus on the social dimension of communication, he insufficiently examined the progressive integration of technology in daily life, resulting in transformations of the communication patterns and information patterns in the case of classical telephony. To understand the changes in communication culture and history of mobile telephony, one should pay more attention not only to the history of technical inventions and devices, but also to the general socio-cultural frames, shifts in uses and functions and in users’ needs and expectations. More focus should be placed on the act of mobile phoning and the spatio-temporal behavior of communicators during technology usage. In addition, Winston considered mobile telephones simple spin-offs of radio. Although it could be a correct perspective *per.se.*, it is somehow limited. Instead, more emphasis should be put on the creative integration of several inventions, which succeeded in launching the challenging multifunctional medium, which is currently the mobile telephony. In Figure 2, several “turning points“ can be recognized in the development of technology as apparatus, corresponding to decisive take-offs from the science level through ideation to “technology“ skies.

- “Radio spoken communication”
- “Establishment of real mobility”
- “Mediamatic: voice and data integration”
- “The universal connectivity”

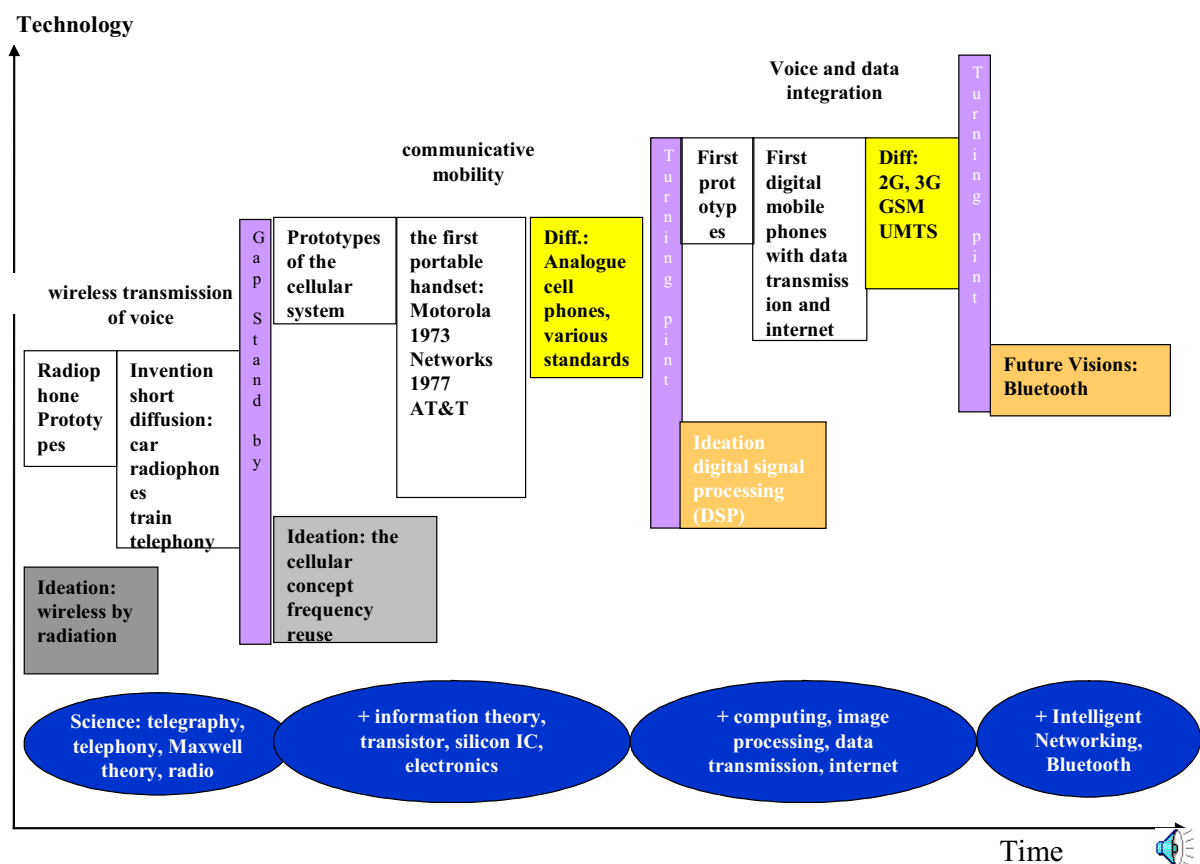


Figure 3. Apparative developments corresponding to *wireless dispositif avatars*

2.3.2.2. The Beginnings of the “Wireless” Arrangement in the *Dispositif*: Radio Spoken Communication

Scientific ideas, which nourished the early wireless technological developments, included: electrical telegraphy; telephony; Maxwell Wave theory; and the radio.

Ideation in this field exhibits a certain internal evolution beginning with the idea of using magnetism and electricity for a signaling system (Winston, 1998). This idea was advanced already at the middle of the XVIIIth century by Charles Marschall²² and the application of electricity to the processes of human communication represented the research objective of several electrical experimenters. Winston attributes the ideation of the modern telegraph to Schwenteer and Ampere. Further, the first prototype of the telegraph dates to 1819, when:

“...it was noticed that an electric current would deflect magnetic needles and Faraday discovered that a freely-moving magnetized needle when surrounded by a wire coil will respond to the power of the electrical current in the coil. The would-be electrical telegraphers acquired a signaling instrument using dynamic electricity, which was to disperse the bubbles and banish the pitch balls” (Winston, 1998, p. 23).

The electric telegraph, optimized on the basis of letter frequency and charged by the number of words, was the first step on the road to information technology, as the Morse code, with its dots and dashes and pauses implied the use of fewer signs and announced the emergence of the binary code. This technology constitutes a model for all forthcoming electrical signaling systems (Winston, 1998, p. 29), because it promoted:

- Rapid transmission
- Stable network to support transmission
- A specialized technical personal charged for exploitation and maintenance
- Information coded into “an universal language” (Flichy, 1999, p. 48)

The *dispositif* created by electrical telegraphy (Figure 3) aimed to structure the transmission and interpretation of information, mainly of a public nature, instead of interpersonal communication. Coded information instead of human voice was transported; and signals had to be interpreted by “human interfaces”. At the beginning, the content was mostly military and commercial, and, only later, telegrams served the preservation of private relations.

²² Giesecke, 2002.

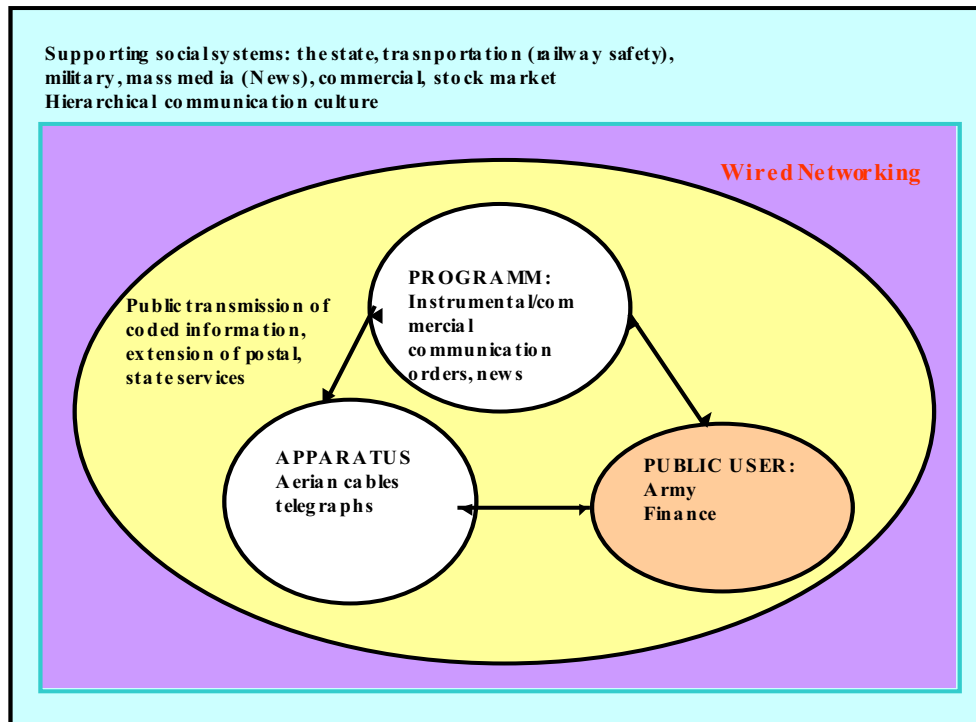


Figure 4. The *dispositif* of electrical telegraphy

The growing demand for private/family communication made that much effort be dedicated to the creation of a communication medium, which could transport the human voice itself—the telephony. The string telephony represented thus the second important component of the nourishing ground for mobile telephony development. Most of the researchers agree that telephony development began with the first practical realization of phone communication²³ by Alexander Graham Bell, an American inventor and physiologist. He is generally considered the “father” of the telephone, although Elisha Gray developed at the same time a telephone set and patented it a few hours after Bell. It should be said that Bell’s telephone represents just the surface of a long succession of tries and successes in the field of human voice transmission. The ideation, which led to the prototype of the telephone, consisted in the electrical transmission of speech. Whetstone’s notion of creating an analogue of the human voice, together with the reference to undulations, were essential to the idea of telephone (Winston, 1998, p. 37). Other connections between voice transmission and electricity were realized by du Moncel (1853) and Boursel (1854) (Winston, 1998, p. 37-38). During the prototype phase²⁴, the apparatus will often already be at hand, serving other purposes - a parallel prototype in Winston’s terminology (Winston, 1998, p. 43). Since there were so many experimenters, Bell’s recognition as the father of the telephone could derive from the fact that

²³ The earliest practical telephone transmitter consisted of a diaphragm attached to a wire. The end of the wire was dipped into a bowl containing an acid solution and an electrical contact fixed to the bowl. As the voice vibrated the diaphragm, so the wire moved. This created a variable resistance in the solution, which was registered through the contact. (Winston, 1998, p. 30)

²⁴ Reiss’s contrivance represents such kind a parallel prototype, being in fact “a kind of invention in a line of devices, technological performances, all designed to demonstrate one or another aspect of wave theory” (Winston, 1998, p. 43). As Winston pointed out, Reiss who was a researcher into Helmholtz’s wave theory wasn’t particularly looking for a system to transmit the human voice. (Winston, 1998, p. 51). The results of his experiments were, however, known by inventors of the commercial telephone like Elisha Grey (Winston, 1998., p. 44).

he successfully surpassed the mental set of the “telegrapher” and tried to favour a technology based on the spoken word on the expense of the multiplex telegraph. As Flichy (1999) singled out, for the telegraphers, the telephone meant only an instrument to make communication between operators easier. On the contrary, Bell aimed to make the telephone an instrument of distant communication that did not require human mediators.” (Flichy, 1999, p. 113).

The success of the telephone “utopy” was also dependent on the way different societies assigned to the new technology very different purposes. As Flichy pointed out, at the beginnings of the telephone, the Frenchmen regarded it as a power instrument, while the Englishmen were attracted by its commercial utility (Flichy, 1999, p.111). In spite of the declared good expectations, for a long time, the speaking telephone was inscribed in the public’s awareness as the latest technical marvel, but practically it wasn’t very much employed. As Winston emphasized, the rising and the legal creation of the modern corporation and the modern office represented the real supervening necessity for the diffusion of the telephone. The new type of office building, “a sort of vertical human case, with uniform windows, uniform accommodations, a uniform façade,” accelerated the introduction of the elevator, typewriter, the mechanical desk calculator and the telephone (Winston, 1998, p. 52).

The standardized device, virtually the contemporary telephone using carbon granule in a technique patented by Edison in 1886, was developed by both Edison and Blake but only came into production in 1895 (Fagen, 1975, p. 82-3 quoted in Winston, 1998, p. 58). Automatic centrals were rapidly implemented. In Germany, the first automatic central was put into operation on July 10, 1908 in Hildesheim (with 1200 possible connections). Overall, the infrastructure, the wired system, extended at a fast pace: for example, in 1900 in the USA there were 1,6 Mio. Km Telephone wires, which linked half of the USA population. In 1891, the first underwater telephone cable ensured phone communication between France and England.

The explosive development until present proved that wired telephony constructed a consistent *dispositif* of communication, which represents an important resource for the emerging wireless *dispositif*.

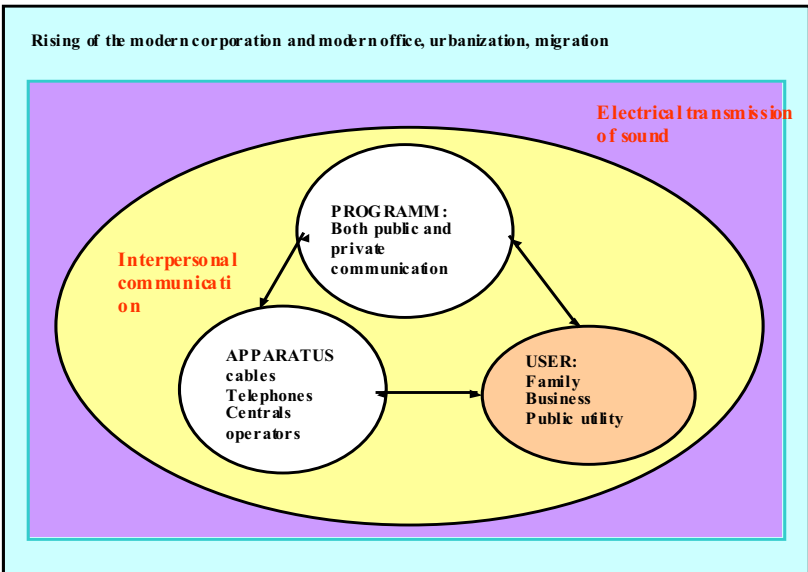


Figure 5. The communication *dispositif* of classical telephony at its beginnings

The telephone usage has produced a distinct interpersonal communication structure, which stays at the basis of the one created by mobile telephony (Cornita, 2001). However, regardless of the possibility to transport the human voice, the classical telephone could not be regarded as a true personal communication *dispositif* yet. As Geser emphasized, because fixed telephones were set for specific locations instead of belonging to specific persons, they supported rather depersonalized and collectivized communication structures, as found mainly in bureaucratic organizations, as well as in many less formalized settings such as dormitories or traditional family households (Geser, 2003). At some moment, however, increased mobility needs coming from the acceleration of daily life and traffic development demanded the development of a place-independent and personalized medium. In these conditions, what guided the phone communication technology on wireless paths was the development of radio.

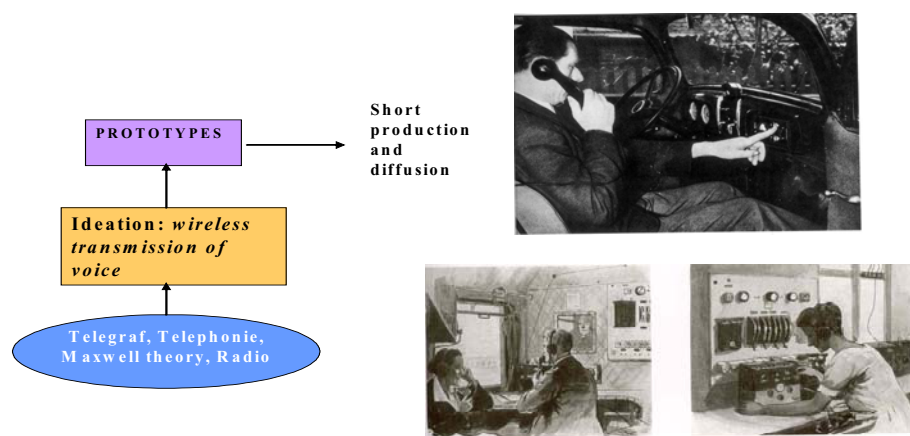


Figure 6. Invention and diffusion of the first devices to communicate wirelessly through the atmosphere. Source of the images: *Mensch Telefon, Aspekte telefonischer Kommunikation, Museumstiftung Post und Telekommunikation*, herausgegeben von Margret Baumann und Helmut Gold, Ed. Braus, Heidelberg, 2000

The race for wireless began with the idea of wireless transmission by radiation, meaning that high frequency, rapidly moving waves get generated by electricity and radiate from a fixed point like an antenna. In 1864 Maxwell released his paper *Dynamical Theory of the Electromagnetic Field*, which emphasized the relation among light, electricity, and magnetism and revealed the wave pattern of the electromagnetic phenomena. The radiotelegraph benefited from these discoveries. As Farley (2002) pointed out, ideation for the radiotelegraph may have belonged to Loomis (1872), as being the first person to communicate wirelessly through the atmosphere²⁵.

²⁵ “Between 1866 and 1873 he transmitted telegraphic messages a distance of 18 miles between the tops of Cohocton Mountain and Beorse Deer Mountain, Virginia. Perhaps taking inspiration from Benjamin Franklin, at one location he flew a metal-framed kite on a metal wire. He attached a telegraph key to the kite wire and sent signals from it. At another location, a similar kite picked up these signals and noted them with a galvanometer. No attempt was made to generate high frequency, rapidly oscillating waves; rather, signals were simply electrical discharges, with current turned off and on to represent the dots and dashes of Morse code. He was granted U.S. patent number 129,971 on July 30, 1872 for an ‘Improvement in Telegraphing’, but for financial reasons did not proceed further with his system“. (Tom Farley, *Mobile telephone History*, <http://www.privateline.com/PCS/history2.htm>).

Early prototypes were the first radiophones and radios experimentally built and operated by David Hughes (from 1879 to 1886), Hertz (in 1888), and Marconi (from 1894 to 1901). Based on the results of the former experimenters, Marconi grounded the first successful and practical radio system. Driven by his obsession of distant communication, he started in 1894 with his first electrical experiments and continued until 1901, when his radiotelegraph system sent signals across the Atlantic Ocean. On December 24, 1906, Reginald Fessenden accomplished the first radio band wave communication of human speech over a distance of 11 miles, from Brant Rock, Massachusetts, to ships in the Atlantic Ocean (Farley, 2002)²⁶.

Two interesting aspects noticed by Winston in this development phase are: first, that wireless transmission of voice suffered from interferences²⁷, and second, that, because the message was broadcast, the content became accessible to many unwanted hearers. The stronger broadcasting communication model promoted by society thus hindered the privacy of point-to-point communication required by interpersonal communication. Over time, the social use of the radio communication modified considerably; its role as a vector of maritime transmission became secondary, and the radio turned into a mass medium, leisure instrument, closely related to the phonograph in its purpose of furnishing home music and entertainment (Flichy, 1999, p. 145).

The possibility to transmit not only dots and dashes, but human voice through the atmosphere, stimulated the interests of several key public and private users. Distinct from radio broadcasting, further inventions like train telephony and car mobile telephones emerged from public and military needs and were promoted by these systems²⁸. In Germany, particularly train telephony developed, as Gold presented:

“Tatsächlich wurde im Laufe des Jahres 1926 bei allen D-Zügen auf der Strecke Hamburg-Berlin die Zug-Telefonie per Funk eingeführt. Natürlich standen die Fahrgästen damals keine ‚Handys‘ zur Verfügung, wohl aber ein Telefonabteil, von dem aus ein „Fräulein von Amt“ angerufen werden konnte, das dann die Verbindung schaltete. Die Waggons auf dieser Strecke waren mit deutlich sichtbaren Drähten auf dem Dach ausgestattet, so-gennante Langdrahtantennen, die Signale per Langweile an das öffentliche Telefonnetz entlang der Bahnstrasse abgaben. Erprobt worden war die Zug-Telefonie schon 1918 auf der Militärbahnstrecke Berlin-Zossen und 1919 auf der Privatbahn der Firma Görtz zwischen Teltow und Lichterfelde, bevor sie dann als „öffentlicher beweglicher Landfunkdienst“ auf der erwähnten Zugstrecke eingeführt wurde” (Gold, 2000, p. 79).

Unfortunately, at the beginning, the devices necessary for a reliable transmission and reception were huge and not portable:

“Die Sendeanlagen hatten für heutige Verhältnisse gigantische Ausmaße und benötigen entsprechend großräumige Fahrzeuge. Insofern war die Unterbringung in einem Zug bereits

²⁶ In *TelecomWriting*, <http://www.privateline.com/PCS/history3.htm>, 21.03.2003.

²⁷ “It was soon discovered that wireless was seriously subject to atmospheric disturbance...furthermore, there was also a question of privacy where the wires across the landscape seem to have an advantage. Sending a signal to all hearers, if you were not a sinking ship was an aberrant, even revolutionary act. This was literally so in the case of the Irish who proclaimed the existence of an independent Ireland in a Morse message broadcast from the roof of the Dublin Post Office during the Easter Rising of the 1916. The Germans too had produced a new bulletin in Morse designed to be heard by neutral countries the previous year. (Karrupiahia 1996: p. 9, quoted in Winston: 1998: p. 73)

²⁸ “In particular police and emergency services drove mobile radio pioneering, therefore, with little thought given to private, individual telephone use. Their equipment was experimental, with practical systems not implemented until the 1940s, and no interconnection with the land based telephone system.” (Farley, 2002, id.).

eine Pionierleistung, die von den Technikern der Zeit entsprechend stolz dargestellt wurde” (Gold, 2000, p. 79).

In the next years, the early conventional radiotelephone developed and progressed towards miniaturization. World War II favoured intensive radio research and development for military at the expense of work on civilian commercial mobile telephony. Nevertheless, during the war, in Germany, the technology further developed and a civilian network was available to the public. Until 1950, various local mobile networks were implemented in Germany, in harbors and trains, and were based mainly on long and medium radio waves (Gold, 2000, p. 81).

The scientific discovery of wireless by radiation led to the constitution of the general ordering principle in the mobile telephony *dispositif* - wireless networking (Figure 6) - bringing a decisive change in the nature of communication and information transmission. As Giesecke (2002) emphasized, with wireless networking communication was no more strongly dependent on geographical (channels, streets, rivers, cables) and social structures, and it was based instead on electromagnetic round “radiation” spatial structures, which announced the emergence of the “cells”. As a result, sources and receivers were no more place-and social-bound; they could move; therefore, communication contacts became more dynamic²⁹. In addition, for the first time, the modulation of natural resources was used instead of artificial channels³⁰. Different information types, all images, and tones produced by humans could be sent and received through wireless waves, fact that turns the medium into a “multimedia platform,” an integration instance for many other media³¹:

²⁹ “Die Vernetzung der Gesellschaft erfolgte zunächst durch Straßen und Wasserwege, dann durch Eisenbahnen und Kanalisation und anschließend durch die elektrischen Drähte. Dabei baute jedes Netz auf das vorhergehende auf. Alle technischen Medien, die die Menschen und Institutionen miteinander dauerhaft verbinden, schienen und scheinen der Gesellschaft als geeignete Kommunikationsmedien. Emanzipation der Kommunikationsnetze von der ökonomischen und institutionellen Netzen haben Rundfunk und Telefon enorm gefördert“ (Giesecke, 2002, online citation).

³⁰ „Aber der Rundfunk hat die traditionelle Richtung der Technisierung der Vernetzungskanäle eigentlich nicht fortgeführt. Er setzt nicht so sehr auf ein synthetisches Medium als vielmehr auf die systematische Verstärkung eines natürlichen Mediums, der elektromagnetischen Wellen oder des Äthers, wie es früher hieß. Damit steht er, was die Vernetzungsstrategie angeht, der natürlichen face-to-face Kommunikation näher als den skriptgraphischen, typographischen oder telegraphischen Medien.“ (Giesecke, 2002, online citation)

³¹ „Auch was das Repertoire, die Informationen, die auf den Neuen Netzen zirkulieren, angeht, so haben die Telefonpioniere dem Rundfunk den Weg gewiesen: Sowohl der institutionelle Gebrauch als auch die private Vernetzung und die Idee der Massenkommunikation wurden bei der Anwendung des Telefons ausprobiert. Neben den aus den Print Medien bekannten Informationstypen: Nachrichten der verschiedenen art, Literatur, Wissenschaft trat auch schon bei Telefonrundspruch die Unterhaltungsmusik. Gefördert hat Funk andererseits zweifellos die Dynamisierung und die Internationalisierung der Kommunikationsbeziehungen und die Mobilität der Gessellschaft. Nicht nur Schiffe, sondern bald auch die Flugzeuge, die Raumfahrt, dann die Eisenbahnen und Autos , kurz: alle beweglichen Sender und Empfänger sind auf drahtlose Vernetzung angewiesen, um jederzeit erreichbar zu sein.“ (Giesecke, 2002, online citation)

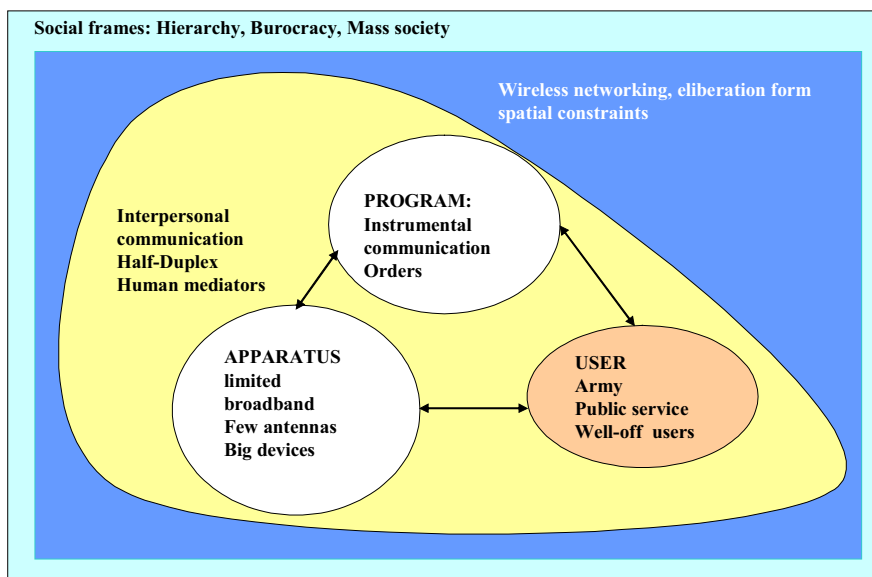


Figure 7. Constitution of wireless networking and the *dispositif* in its Childhood

The aforementioned considerations support the thesis that transmission of voice, together with the wireless technical infrastructure, represented indeed real turns in the constitution of the mobile communication *dispositif*. However, it should be recognized that the first avatar *dispositif* of radio spoken communication was unstable and immature. Because the usage frame was unilateral, communication indirect, technical mobility imperfect, and the user himself/herself limited as a category, this early *dispositif* failed to consolidate the theoretically born mobile communication and to construct communicative mobility. Let's examine these drawbacks in detail:

Concerning the social frame: The society³² in which the first radiophones appeared featured high bureaucracy, rationalization, strong hierarchy and mechanization. Therefore, this was not really supportive for the technical dream of personalized and customized communication devices, both tokens of individual liberty and creativity. Wireless telephony beginnings were also burdened and slowed down by the fact that in some countries, wireless communication began under institutional pressure, starting from the idea that radio frequencies were a scarce resource. In the USA, regulation commissions were partially responsible for the slow progress of mobile communication, thus suppressing its potential.³³ (Berresford, 1989) Various suits and competition fight of companies also burdened the path of technology development.

³² As Rule maintained, "from the end of the nineteenth century to roughly the 1960's, social critics held it axiomatic that the world's advanced societies were dominated by mass processes. Populations were seen as constantly at risk of manipulation from remote, powerful government and corporate organizations." (Rule, 2002: P242). In this vision, mass media transported standardized, over-simplified, and emotion-charged messages, which wash the minds and manipulate the citizens (Rule, 2002, p.242).

³³ As Berrersford claimed, in USA "three bodies of law influenced the early years of the cellular business: the Communications Act of 1934, the federal antitrust laws, and state public utility laws. The Communications Act comes into play because mobile telephone service requires radio frequencies, and the Communications Act entrusts them to the Federal Communications Commission ('FCC'). The FCC, often deciding among competing applicants for the same frequencies, allocates groups of frequencies to different uses and then assigns frequencies within those groups to individual parties. Under these licensing powers, the FCC decides who may

Concerning mobility: At this time, technical conditions allowed only a limited mobility in space. As Farley described, it was required that communicators called when they were near antennas or central transmitters. They should also know where, approximately, the person was to whom they were talking. The commercially operated radiophones work as follows: a central transmitter was used to page mobiles and deliver voice traffic on the downlink. Further, mobiles, based on a signal-to-noise ratio, selected the nearest receiver to transmit their signal to, getting messages on one frequency from the central transmitter and sending their messages to the nearest receiver on a separate frequency. These receivers and antennas collected the traffic and passed it on to the largest telephone office, where the main mobile equipment and operators resided. The user dialed 'Long Distance' and asked to be connected with the mobile services operator, to whom he gave the telephone number of the vehicle he wanted to call. Further, the operator sent out a signal from the radio control terminal, which caused a lamp to light and a bell to ring in the mobile unit. The occupant answered his telephone, his voice traveling by radio to the nearest receiver and thence by telephone wire. To place a call from a vehicle, the occupant merely lifted his telephone and pressed a 'talk' button. This sent out a radio signal that was picked up by the nearest receiver and transmitted to the operator (Farley, 2003, online citation). This scheme was technically workable, but required human operators and was complicated and expensive. Improvement would have nonetheless been on the way of being implemented if suppression had not worked so well at this phase.

Concerning the programs: In the early beginnings of radiotelephones, the delay in apparatus constitution and the suppression from the institutional frame were both too powerful to leave place for a product development, which would emerge directly from consumers' needs. As already stressed, limited mobile communication was technically possible. The illusion of direct communication, the dissolving of space and time during communication, did not occur. Radiotelephones did not really allow the exchange of direct prompt replies, but a human operator handled the switches and intervened in the communication sequel. In addition, only a half-duplex communication was possible in radiotelephony (turn-taking system), meaning that the communicator had to send his/her message, then to signal the end of communication and to wait for the partner to respond, and so on. The impression of closeness and intimacy suffered under these attacks to privacy.

Concerning the user: Due to the huge dimensions and the expensive prices, the first radiotelephones enjoyed only a scanty diffusion among public service users: police; fire departments; physicians and midwives. Very few wealthy people (businessman, bankers) owned personal car telephones. The private user of fixed telephony committed to family communication had not been constituted in completion to the professional user yet.

All in all, in this phase, technical imperfections and various social and economical constraints hindered the consolidation of a true mobile communicative structure in the *dispositif*. Although promising and innovative, the new-born technology had faced so many difficulties that its development had flattened for several decades, until explosive advances in the

use each frequency for what type of communications, where, and when. The FCC may also impose technical regulations on the use of frequencies and on the equipment that transmits and receives communications on them. [FN5] The statutory standard for FCC radio action is whatever would serve 'the public interest, convenience, or necessity.' [FN6]. Although in 1947 the AT&T proposed that the commission allocated a broad range of frequencies so that mobile telephony became a mass phenomenon, the allocation was denied for the reason that: other uses of the frequencies – for police and fire departments would better serve the public interest". (Berrersford, 1989, p. 2).

scientific background and relaxation of the regulation frame allowed a strong price decrease, opening the doors for heavy diffusion.

2.3.2.3. The Cellular Avatar and the Constitution of Communicative Mobility

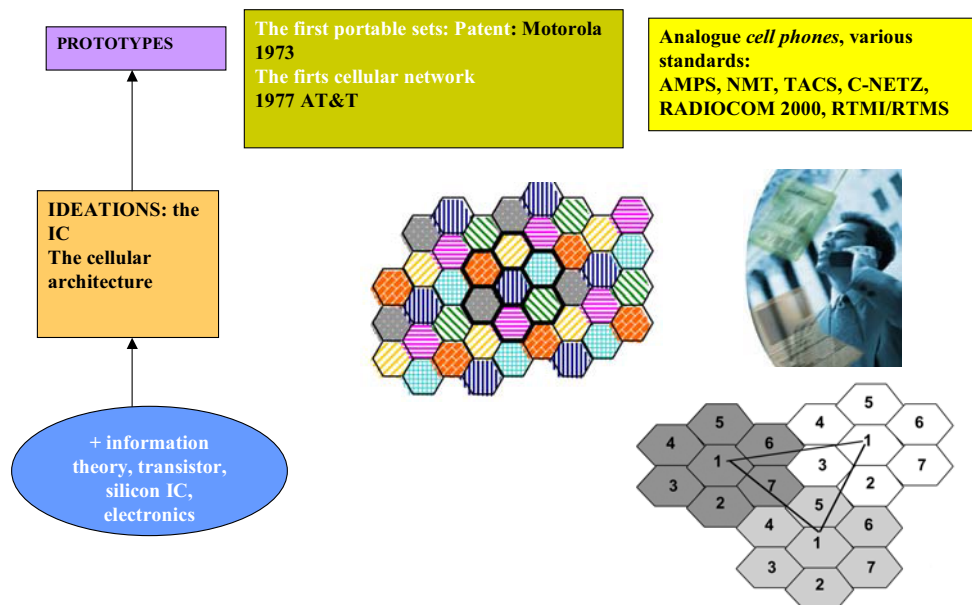


Figure 8. Constitution of communicative mobility- the cellular system and the portable devices

After the second war, science achieved important successes such as stable, powerful and sensitive vacuum tubes and the transistor. In 1954, Texas Instruments started commercial production of silicon transistors instead of using germanium, thus enabling miniaturization of electronics. Moreover, in 1958, Jack Kilby revolutionized the electronics industry when he invented the integrated circuit at Texas Instruments. Intel introduced the first microprocessor, the 4004, in 1971. Designed originally for a desktop calculator, the microprocessor was soon improved and employed in cell phones. (Farley, 2003, online citation) These ideas and discoveries allowed the construction of the real portable handset. Invention for the real mobile handset is granted to Dr. Martin Cooper for Motorola (09/16/1975) for the *radiotelephone system*. Although Bell Laboratories introduced the idea of cellular communications in 1947, with the police car technology, Motorola was the first to incorporate the technology into a portable device that was designed outside of an automobile use (Farley, 2003, online citation). The first commercial systems with mobile devices had begun to operate. For example, in Germany, between 1958/59 various local mobile networks were united in a national network, A-Netz³⁴, which remained in function until 1977. As Gold outlines, in 1968, the A-Netz covered 80% of the German territory, thus being the world's largest mobile network. However, its exploitation remained limited to wealthy users (only 11000 in 1979). Also, the

³⁴ In 1968, A-Netz covered 80% of the German territory and was therefore the largest world public mobile network. Nevertheless, the network capacity was poorly used, given that a restricted category of people can afford to conduct mobile calls (11000 user in 1971). The sets were correspondingly heavy, uncomfortable: (approx. 16 Kg for integration in the car) and very expensive. (Gold, 2000, p.81).

devices were very large, difficult to handle, and very expensive³⁶. The second network- B-Netz (initiated in 1972) represented a small, but decisive step forward. B-Netz had an overall capacity of 27,000 users in Germany and lasted until 1985. Despite some steps towards the miniaturization of devices, mobile communication outside the area covered by the transmission station was not possible. A further extension of the mobility function meant also that persons from Luxembourg, Austria and the Netherlands could be reached. However, many drawbacks of the former A-Netz system remained unsolved.

The basic concept of the cellular system as a new ideation began in 1947, when scientists realized that by using small cells (range of service area) with frequency reuse, they could substantially increase the traffic capacity of mobile phones. In December 1947, Bell Laboratories' D.H. Ring presented the cellular concept for mobile telephony in an internal memorandum, authored by Ring and assisted by W.R. Young³⁸. Basic elements were: a network of small geographical areas called cells, a low powered transmitter in each, and the cell traffic controlled by a central switch, by different cells. Trials for the first automatic radiotelephone service were conducted in the prototyping phase: the Stockholm trial, starting in 1951, conducted by the Swedish Telecommunication, the public trials of the prototype cellular system constructed by AT&T and Bell Labs (1978) in Chicago, with over 2000 trial customers (Farley, *ibid.*). By 1982, the FCC finally authorized commercial service for the USA, and the first American commercial analog cellular service or AMPS (Advanced Mobile Phone Service) was made available in Chicago (Farley, 2003, online citation).

In the diffusion phases, various wireless standards were established: AMPS (Advanced Mobile Phone System in the USA); NMT (Nordic Mobile Telephone in Denmark, Sweden, Finland, and Norway); TACS (Great Britain); C-Netz (Germany); the French Radiocom 2000; and the Italian RTMI/RTMS (Farley, 2003). These first systems were based on analog technology, meaning that radio signals were modulated so that they could carry information such as voice or data. Analog cellular phones worked like a FM radio, meaning that the receiver and transmitter were tuned to the same frequency, and the voice transmitted was varied within a small band to create a pattern that the receiver reconstructed, amplified and sent to a speaker. In Germany, a decisive step to the establishment of the cellular telephony system was represented by the analogue C-Netz, implemented in September 1985. This first cellular German system had multiple advantages: caller positioning through HRL; call forwarding from cell-to-cell; a national prefix (0161); the telephone number linked with a Chip (the forefather of the Sim-card); more channels; more users; cheaper prices; data transmission; fax. With 850.000 users, C-Netz reached in 1993 its full capacity. However, this network did not develop into a mass product.

³⁶ As Gold described: "Die Geräte waren mit einem Gewicht von etwa 16 Kg im wesentlichen für den Einbau in Fahrzeuge konzipiert und sehr teuer. Selbst ein Standardgerät kostete mehr als ein Kleinwagen dieser Zeit und die Bauteile waren so voluminös, das selbst bei Luxuslimousinen ein Gutteil des Kofferraumes damit ausgefüllt wurde. Alle Gespräche wurden von Hand vermittelt, wozu seitens der Post bis zu sechshundert Vermittlungskräfte nötig waren. Beim Wechsel des Sendebereichs wurde das Gespräch unterbrochen, und die Suche nach dem neuen Anrufkanal musste der Teilnehmer von Hand vornehmen." (Gold, 2000, pp. 81-82)

³⁸ In 1968, AT&T and Bell Labs proposed a cellular system to the FCC of many small, low-powered, broadcast towers, each covering a 'cell' a few miles in radius and collectively covering a larger area. Each tower would use only a few of the total frequencies allocated to the system. As the phones traveled across the area, calls would be passed from tower to tower (Farley, 2003, online citation).

The second stage, until the rise of digital mobile devices (GSM and enhanced UMTS), represented a clear step forward to the constitution of communicative mobility in a more stable and complex wireless avatar *dispositif*.

First of all, the social frame suffered significant qualitative changes when the first generation of mobile systems diffused (the 90's). In the second development phase, from the implementation of the cellular system to the enhanced digital mobile value-added services, the society itself reached another stadium when networking, and overall association was generalized as a rule³⁹. The social necessity for a cellular system supporting a quasi-ubiquitous communication was that everybody should be linked with everybody, everywhere and anytime. Also, the classes of social necessities singled out in the early phases continued their influence on mobile telephony development: traffic increased and diversified, corporation became more and more powerful and international, and the flexibilization of the working patterns generalized with the intertwining of the work time and pastime patterns, public and private spheres. It could be said that the cellular architecture and the portable device emerged from the underlying need of managing the integrated global network (Castells, 1996) brought by the incorporation of similar information technologies into historically very different businesses. Castells tried to understand various global events⁴⁰ in a coherent manner, describing the main features of the emergent dominant structure – the network society- that is characteristic of *informational capitalism*. While some features of the network society have a socio-economical nature⁴¹, others directly define a new spatio-temporal disposition underlying mobile telephony usage. According to Castells, the network society is organized around new forms of time and space: timeless time and the space of flows. Social organizations reconstitute themselves according to the *space of flows*, which is made up of three aspects: technology, places, and people. This implies a *culture of virtuality*, characterized by *timeless time* and *placeless space*. These “dispositions” are meaningful for the mobile communication *dispositif*, too.

³⁹ Many researchers claim that mobile communication represented a societal phenomenon that served to sustain the ubiquitous communication and consumption culture. Additionally mobile communication was regarded as a means of networking in the information society (Oksman et al., 2003).

⁴⁰ As Huckle (2002) states, among them were the diffusion and deepening of IT revolution, including genetic engineering, the collapse of the Soviet Union and the demise of the international communist movement and the corresponding end of the cold war. This led to the re-structuring of the capitalism. The process of globalization associates with a surge in nationalism and to a crisis of the sovereign national state, but also with a crisis of democratic politics. Other major events were the rise of feminism and ecological consciousness. As a reaction to globalization, the communalist became stronger. Finally, a global criminal economy started to have a great impact on the international economy, politics and everyday life. (Huckle, 2002, online citation)

⁴¹ “an informational economy strongly dependent on knowledge, information and the technology, a global economy involving strategically dominant activities working as a unit in real time on a planetary scale, the network enterprise which also extends its logic to other domains and organizations, and the flexibilization of work with the corresponding social polarization and social exclusion.” (Huckle, 2002, online citation)

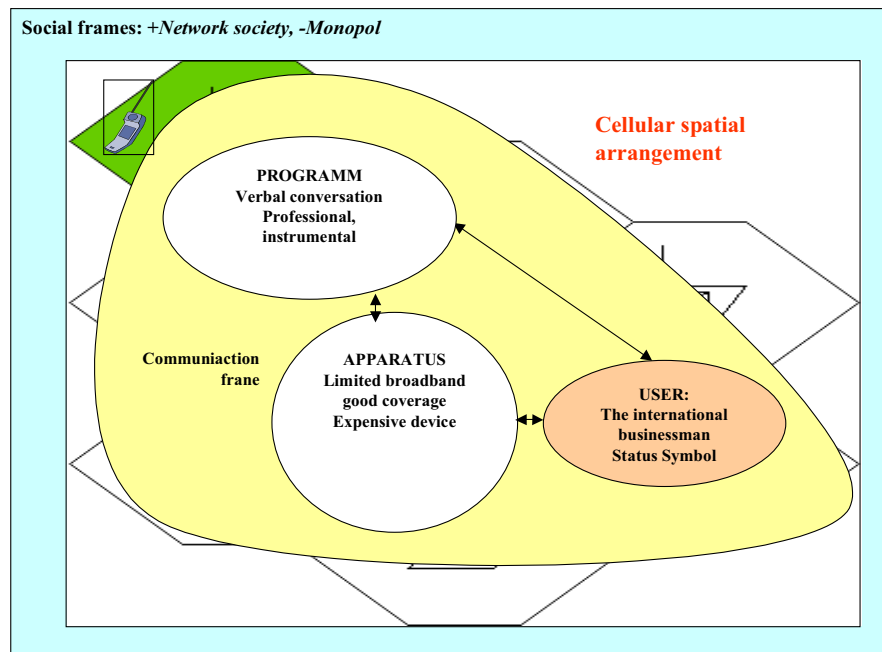


Figure 9. The mobile communication *Dispositif* avatar

Although the overwhelming tendencies towards networking favored technology production and diffusion, some components of the socio-political frame acted as suppressive forces. For instance, when mobile telecommunications first commenced commercial operations in many countries, industry specific economic regulation was relatively light. In contrast to fixed telephony, mobile telephony often started from a position of (limited) competition that empowered diffusion. A minimum set of regulations sufficed to ensure compatibility of the interfaces and integrity of public networks. Only after the terminals were withdrawn from the classical monopoly game and internal subsidies were distributed among different groups of network subscribers, could the true benefits of modern technology be discovered in the market (Arnbak, 2000: p.3). Another suppressive force lays in the relationship between technologists and policy makers. Modern governments had to handle an increasing number of issues that required extensive knowledge of science and technology for effective decision-making. Conflicts and delays were the results of this gap. For example, in the USA, the FCC can be again partially blamed for the big delay between the initial concept of cellular service and its availability to the public.

In the new constituted *dispositif*, impressions of natural communication, illusions of reality; closeness; and ubiquity, which define the *mobile communication structure* have started to build up. Although the usage programs were limited and communication restricted to verbal, there were signs that an explosive change was on the way, prefiguring a decisive reorganization within the *dispositif*. A significant gain of the technology at this time was that, for the first time, the cellular system and frequency reuse accommodated many users within the same area and ensured a real mobility in space. In addition, the increasingly miniaturized handset itself was really portable, easy to carry and handle. As a consequence of technical

advancements and value-added services, the segment of business mobile users started to prevail over public service users⁴².

2.3.2.4. Voice and Data Integration - Consolidation of the *Dispositif*

In terms of apparatus changes (see Figure 9), digital signal processing represented a decisive step forward, given that it opened the doors for the integration of telecommunications, computing, and radio in a single technology. The digital service represents a method of encoding information using a binary code of 0s and 1s, and in connection to wireless communication technology, this means that the analog voice signal is converted into binary code and sent as a series of on and off transmissions. The most important advantage is that digital signal processing made it possible for data and wireless Internet to be transmitted. However, heavy data transmission (multimedia in particular) occupies a huge bandwidth, and strategies to accommodate the communication necessities and frequency resources are needed.

During the early 1980s, there was much effort in Europe to create a single European wide digital mobile service with advanced features and easy roaming. GSM has been the only one of the existing technologies providing data services, such as: e-mail; fax; Internet browsing; and intranet/LAN wireless access. It has also been the only service that permitted users to place a call from either North America or Europe. Various national networks have been built with digital technology. For example, in Germany, in 1991, the analog C-Netz started to be competed by the digital D-Netz and further by Mannesmann Mobilfunk or "D2-Privat". The implementation of D-Networks represented the real beginning of the mobile telephony triumph and full diffusion in Germany. Approximately 4 million users employed the capacity of the network and enjoyed the additional advantages: international roaming in more than 150 countries, digital speech transmission, and SMS. In 1994, the private E-plus 1800 GSM was grounded and worked very well particularly on the pre-paid market. The E-Netz (also called PCN or DCS) represents an improved version of GSM 900. In October 1998, VIAG Interkom (E2) constructed another E-Netz that, with the cheaper call prices of Genion, competes even with the fixed network tariffs⁴³.

Although mobile telephony started as a premium service, offering voice transmission with mobility, it further evolved into a more mature offering of combines voice and data services (Arnbak, 2000, p. 7). As Arnbak also outlined, the mass production of 2G mobile phones brought affordable, yet highly advanced professional terminal features within direct reach of consumers. In particular, introduction of the 'smart-card' technology in the European GSM-standard represented a real "*coup*" with significant effects on consumers. Highly personalized, professional security and service features were programmed in a low-cost chip card (known as the subscriber identity module or SIM-card), which could be inserted into any GSM-terminal. Two of the most successful branches of information technologies crossed over: the PC and the mobile phone in order to support international mobile computing; Group III fax; short message services (SMS); and wireless access to the Internet. A challenge is also the necessity

⁴² As Sandor Bakalis, Muriel Abeln and Enid Mante-Meijer revealed, at the beginning of 1990 research results indicated that only international mobility in this respect showed a significant correlation with adoption of mobile telephony, which meant that mobile telephony, at that time, was mainly a business tool. Adoption was then positively associated with an undeveloped fixed network or poor development of the fixed network due to the geographical factors like in Norway or Finland (Bakalis, Abeln and Mante-Meijer, 1997, p. 1).

⁴³ Source: http://www.handy-freak.com/html/handy_history.html.

to achieve and manage fixed-mobile integration, based on the use of Intelligent-Network and Telecommunication Management-Network (Arnbak, 2000, p.7). New-generation wireless communication systems (third generation – 3G) based on the UMTS standard are now expected to offer considerably higher rates for data transmission and allow significantly increased flexibility. A wide variety of services is expected, ranging from voice and paging services to interactive multimedia (MMS), including teleconferencing and Internet⁴⁴.

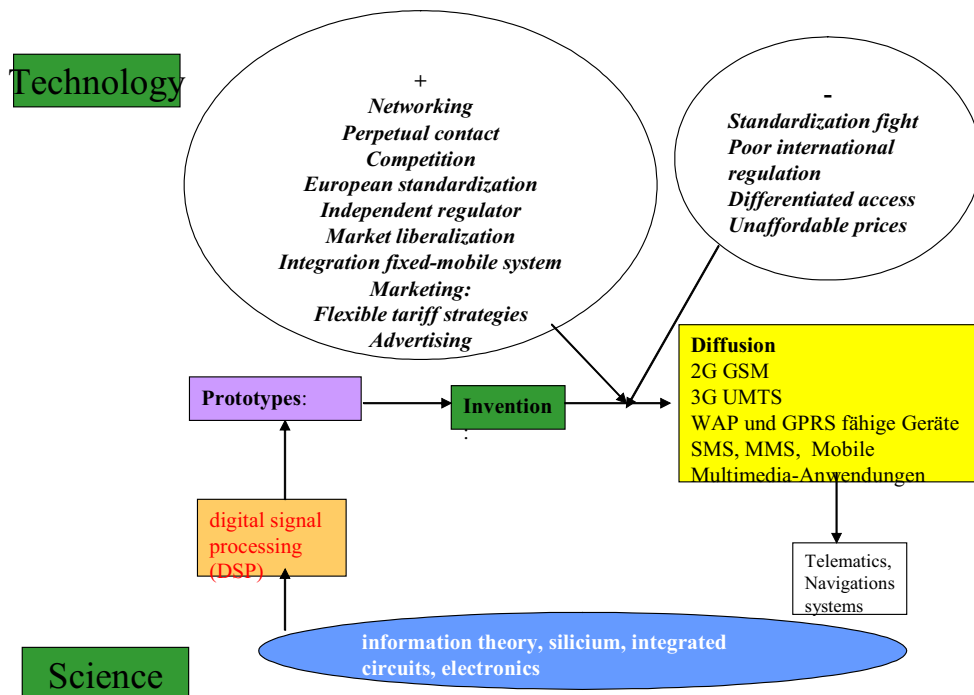


Figure 10. The integrative mobile communication and information technology. Factors favouring and hindering diffusion

Next to the apparatus, the social frame of the current *dispositif* features a considerable complexity. The logic of perpetual contact stays at the basis of the heavy usage of mobile telephony, as Katz and Aakhus in the theory of *Apparatgeist* (Katz, Aakhus, 2002, p. 309) argued. A strong development of the storage facilities and written/iconic contact directly emerges from this need. A growing institutional arena is developing, comprising of interoperable mobile devices and services and applications achieved through intensive collaboration between the various industry participants, such as: mobile operators; wireless vendors; information technology companies and content: software and application providers⁴⁴.

Cultural and social changes, together with technical advances, have contributed to the birth of the current manifold *dispositif* (see Figure 10). Next to *mobile communication structure*, nowadays, *communicative/informative mobility* is successfully constituted and effective, since users are employing the cell phones more and more to manage their travel or to orient in the

⁴⁴ Source: *Implementing Openness - Enabling Successful Business for All*, online at: <http://www.nokia.com/openness/index.html>.

physical space. Coordinative issues in verbal telephony and SMS, the usage of the Wireless Internet or Location-Based Services, are increasing in importance.

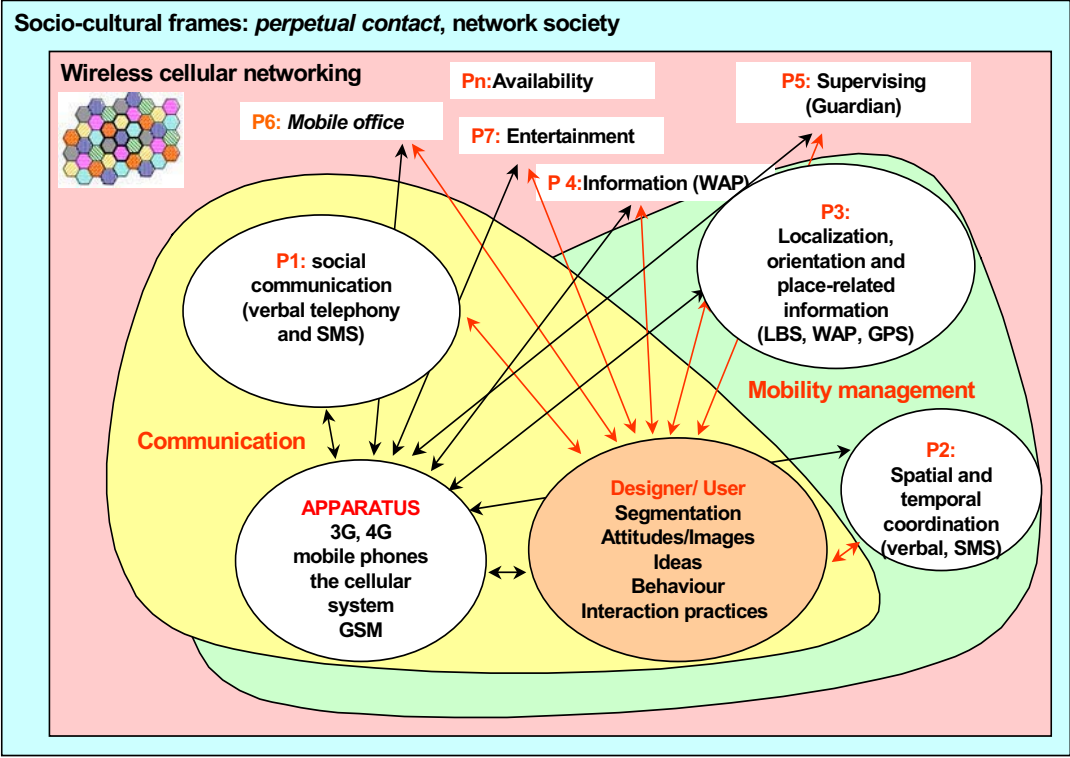


Figure 11. The manifold *Dispositif* of the current mobile telephony

It should be added that a complex menu of programs includes communication (verbal, scriptic or iconic); data transfer; context awareness; orientation; localization through Location-based Services; supervising (Guardian Services). The list is continuously growing since new *niche applications* are being implemented. For instance, an extensive analysis and forecasting of multimedia services in mobile telephony, provided by a joint project of IZT; SFZ; and IAT in 2001, identified new niches for mobile multimedia development (M-Live schaltung; M-Diary; Mobile community; Mobile family services) and analyzed their economical and social consequences (see table 1).

Table 1. Niche applications of the Mobile Multimedia provided by the joint project of IZT, SFZ and IAT (2001)

Niches	M-Live schaltung, M-Diary	Mobile community	Mobile family services (localization, supervising the children, organization of the daily life)
Target group	Young persons who look for a closer medial contact with peers	Youth, Teens clubs or associations members Special Interest groups	Families, particularly with two employed parents and single parents
Actual functions and usage	Possible through SMS (M-diary, no services in Germany, only in Japan- a habitual part of te communicational culture)	The Internet already provides many telecommunities, support groups and chats, but they allow only poor real interaction between members. Mobile: still at the beginning- in Germany SMS-Partys, chat, flirt Newsletter, Ratgeber Japan: I-mode Japan	Children mobiles, YOYOPAC not so successful. Many parents and children use a normal mobile phone.
Future scenario (2005)	SMS; EMS, MMS, with contextual shots M-diary: hosting services Communication avatars	Voice and enhanced SMS Newsgroups, Newsletters, Forum and chats are established mobile services. Similar to the Internet communities. Commercial or non commercial (fan clubs, etc) Clubs and associations use mobile communication for as an infrastructure for information exchange or organization LBS- advertising the own location and finding other members.	Enhanced control and supervising functions Simple devices, which allow the continuous contact with children also in the work life. Kinder call centre allows the children to be localized and helped when the parents are not available Mobiles integrated in toys or clothes Info services about modification in the daily program of the children Due to the transformation in the social family structure, organization and scheduling is becoming increasingly important
Economical potential	More traffic M-diary interesting for KMU's	More traffic, more content New web-space, portals Useful for marketing research Information about products Community integrated in products	Potential for new products- at the same time mobiles and toys Interesting for KMU's Services for control and supervising of babies Control of the household devices Mobile online games Kontakt Börse Education services
Social effects	Continuing the „always on line“ Documentation of the daily life- induces self confirmation and presentation of self in the public sphere	Reassurance against „cocooning“(dislocation of the real contacts into the virtual world). Virtual contacts are additional to the real ones. Mobile activities support the activities outside the house and encourage real contacts	Reaction react to the increasing mobility and family dissolution Combination of mobility, support and supervising

Several other resource *dispositives* melt into the present wireless *dispositif*: the wireless Internet adopts the cyberspace disposition of the classical Internet, the SMS these of the E-mail and Instant messaging, derived from earlier *dispositives* of written communication (letters, post), while MMS captures elements of the *dispositif* of photography. Given that telephoning represents only one of the possibilities of the wireless communication technology, various other names have been recently proposed: Personal Information Manager

(PIM), I. T. (information terminal) etc. Since the laptop, itself a mobile/portable device, can accomplish many of the current functions of the mobile communication technology, these two mobile technologies may converge. However, it can be noticed that, in laptops and PDA's, the computing and personal assistant frames respectively prevail, while the current mobile telephony is still oriented towards interaction and communication.

The richness of workable arrangements within the current *dispositif* make the subjects freely and creatively employ the possibilities, bringing thus their contribution to a further development of other elements. In this phase, all arrangements fully work in including and constituting a real mobile user, inside and outside the professional area. With the technology not only adopted, but also domesticated, the mobile phone user represents in this phase a real social and cultural entity. Concerning the act of phoning, it should be recognized that this stage of mobile telephony development proves to be revolutionary from the so-called availability dilemma and the relation of the technology with the private/public sphere (Gold, 2000, p. 85). The liberation from location-dependence means at the same time that private and public spheres mix in the sense that private telecommunication happens usually in a public space, in the presence of other persons who unintentionally witness the conversation. As a consequence, a general irritation of the involuntary public can manifest. Universal standards, together with various storage capacities in mobile phones, strengthen the technical availability and hinder subjects' avoiding intentions. As Gold outlined, this availability dilemma could constitute a psychological problem of usage:

“Im Unterschied zum klassischen Anrufbeantworter des Festnetztelefons, dessen Einsatz für den Fall der Nichtanwesenheit allgemein gerechtfertigt ist, gibt ein solches Argument für die Besitzer von Mobiltelefonen nicht: die Chance der ständigen Erreichbarkeit erzeugt einen gewissen Druck, auch entsprechend verfügbar zu sein. Zu Recht konstatiert die Sozialforschung hier Stress- Potenziale. Überwachung kann so als Form der sozialen Kontrolle entstehen“ (Gold, 2000, p. 86).

Given that non-availability means less stress, the gain in time-control and independence can prove to be relative: “aus dem Wunsch, immer und überall erreichbar zu sein, könnte der Zwang entstehen, immer und überall erreichbar zu müssen. Aus dem Wunsch, nichts verpassen zu wollen, kann der Zwang entstehen, nichts versäumen zu dürfen“ (Gold, 2000, p. 86).

2.3.2.5. Glances into the Near Future: Universal Wireless Networking (Connectivity)

The present wireless technology already contains the seeds of a new qualitative vault, which may change the nature of the *dispositif*. This development is made possible by a variety of between-devices connectivity solutions. Some of them are based, for example, on a short-range radio transceiver called Bluetooth. This chip can be located in a mobile phone or laptop PC, but it could be in almost any electronic device: a camera; printer; VCR; car door lock; or cash register. Its operating range is up to ten meters, and the connected devices do not need to be within line of sight. This solution can broaden the usage frame of the *dispositif* as the examples below demonstrate:

“In the near future you will be able to take a photograph with a digital camera and transfer it wirelessly to your Bluetooth-enabled handset. Then you could add a few lines of greetings and send it all by mail as an electronic postcard. It won't be long before you will be able to answer and make calls using a wireless Bluetooth headset. Or you could put your phone in a wireless car kit, which would provide handsfree operation using Bluetooth. And, while you are sitting

in the airport lounge, you will be able to print out files or emails from your laptop PC on the nearest printer. Bluetooth could be used wherever you want to establish a wireless connection between point A and point B up to ten meters away. For example, you could have an electronic Bluetooth key in your mobile phone to open the car doors. Or you could have your credit card information in your phone protected by a security code and encryption so that you could pay by phone and get an electronic receipt in return. Or you could have wireless headphones for listening to music and you could go into the kitchen to fetch a soft drink from the refrigerator without missing a beat.”⁴⁵

Interpersonal communication in the *dispositif* enriches with a very active *extra-personal communication* - communication between machines and interfaces. One should recognize that extra-personal communication is not a new concept in mobile telephony, given that the "taken-for-granted" mobility results from an internal communication among control devices: mobile phones, base stations, and a mobile switching center. However, with the implementation of universal networking devices like the *Bluetooth*, the machines begin more and more to build their “communicative” world within the wireless *dispositif*. Besides the human subject, a technical double seems to constitute itself as an independent subject of *dispositif* arrangements. In this way, the accent changes from human communicative and information mobility to machine communicative connectivity.

2.3.3. Conclusions

This chapter has examined how the manifold *dispositif* of wireless telephony has been constituted through exploitation of early resource *dispositives* and maturation of wireless *dispositif* avatars. In the middle of the analysis remain changes in social frames, apparatuses, users and programs. A diachronic view of the simplified *dispositif* model can highlight historical transformations in each element and frame.

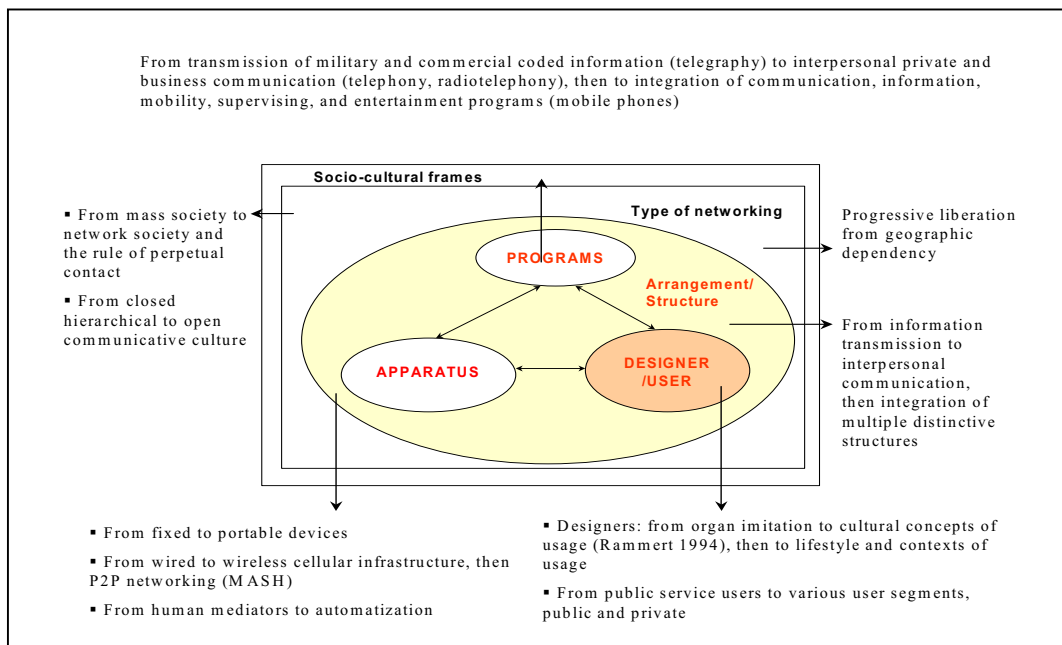


Figure 12. A diachronic view of the *dispositif* development

⁴⁵ Source:

http://www.nokia.com.au/nokia_apac/australia/6210_bluetooth/0,17771,,00.html#connectivity, 3.04.2003.

First, the society in which mobile communication and information devices are currently used strongly differs from the one of its earlier avatars. In the succession of communication and information *dispositives*, there was a passage from the hierarchical industrialized society, with running urbanization and high migration (characteristic for telegraph then telephone *dispositives*), to the networked informational and communicational society after the 90s, in which perpetual contact (Katz, Aakhus, 2002) has been established as a rule. Corresponding communicative cultures of users accompanied these societal transformations: from monologue and closed hierarchical to the open and pragmatic communication, probably influenced by ideals of rapidity and efficiency; from military, commercial, and information transmission in the telegraphy era, to the preservation of remote relations in telephony and the coordination of the daily instrumental and social agenda through communication, information and supervising in mobile telephony.

Also, engineers' ideals and expectations have reacted to social and cultural mutations and suffered significant transformations: from the nature scientists' ideal of life simulation through artificial organ construction, to their orientation towards various cultural visions and concepts of usage (Rammert, 1993, pp. 233-235). In creating new devices and systems, mental sets have been often modified: For instance, Bell's recognition as the father of the telephone could derive from the fact that he successfully surpassed the mental set of the "telegrapher"- creation of instruments to make communication between operators easier, and aimed to make the telephone an instrument of distant communication that did not require human mediators." (Flichy, 1999, p. 113). A step forward was to drive product, service and feature development from a lifestyle point of view. As Bernard Brenner, director of Nokia's Americas Research and Insights group emphasizes, as the mobile phone approaches the mature stage in this market, it will be the context of current and future feature and application usage that will drive product development and industry growth⁴⁶.

Corresponding changes in apparatuses followed, ranging from fixed to portable devices, wired to wireless cellular infrastructure, then P2P networking (MASH), from human mediators to automatization.

It should be recognized that, in spite of the long history of the scientific ground, ideations and even prototypes, the technology had performed rather poorly in terms of creation of user segments until the 1990s. After the invention of radiophones, these had scantily diffused, and a period of stand-by had been installed until explosive technical developments made the devices and the system affordable. This goal was partly accomplished through the implementation of the cellular system, which accommodates many users within the same area through frequency reuse, and by crucial inventions in electronics, which have resulted in truly portable devices. In spite of these technical developments, target users of the first analog cellular phones were international businessman who could afford to buy the rather expensive devices and service and need them to coordinate their mobile work life. The light competition on the market, various conflicts between technologists and policy makers, and the variety of standards were additional suppressive forces. The real diffusion of mobile telephony and the broader user segmentation was facilitated by the implementation of digital signal processing, together with significant advances in integrated circuits technology, which translated in much cheaper devices and service. The economy reacted to the emergence of the successful technology, which came with stronger competition, attractive tariff-plans, and flexible alternatives for every user segment. Consequently, in the current *dispositif*, a variety of user

⁴⁶ Source: The Value of Research. An Interview with Nokia Americas. Available at: http://www.rethinkmarketing.com/intervws/NA_04-06.htm.

segments can be highlighted. The traditional subscriber pool of well-heeled consumers and business users is beginning to subside, as new categories are developing. As Bernard Brenner, director of Nokia's Americas Research and Insights group emphasized, the earliest segmentation in the mid-90s was done on a global basis. It was a top-down approach based on a usage and behavioral model. The current segmentations are rather bottom-up approaches based on socio-psychological and behavioural models. Segmentation variables are lifestyles and values; habits; needs and attitudes of users.

Now, let's move to the changes in *dispositif* programs: - the core of the constitution of the *dispositif*. Historical analysis has shown that the programs of the current mobile telephony *dispositif* represent enriched, combined and rewritten versions of the programs of the early communication and information avatars. Let's shortly follow this transformation process. I will present here only some considerations about telegraphy, telephony, and radio. For instance, the program of electrical telegraphy aimed to structure the transmission and interpretation of information, mainly of a public nature, instead of interpersonal communication. In mobile telephony, this basic information program has been widely rewritten: for a long time its goal has been to provide private users with place-related information needed for spatial and temporal orientation. Only recently a place and time independent information program has been developing. In telephony, the domination of information programs subsided to leave place to a dominant program of social conversation-the basis of the classical telephone dialogue. This program has been appropriated by mobile telephony with a significant modification: in mobile telephony, social communication really became personalized and decollectivized, due to the fact that devices were portable, instead of being set for specific locations (Geser, 2003). The radio *dispositif* only temporarily crossed the roads of mobile telephony development, but nevertheless provided the *dispositif* with a significant structure-the wireless transmission by radiation. After several experiments of wireless transmission of voice, resulting in the development of radiophones, the main social use of the radio communication modified considerably; its role as a vector of maritime transmission became secondary, and the radio turned into a mass medium, leisure instrument, closely related to the phonograph in its purpose of furnishing home music and entertainment (Flichy, 1999: 145). Nevertheless, new developments of mobile telephony tend to recover even this program in a newly developing entertainment frame.

Thus far, I have discussed programs of past communication and information *dispositif* avatars. Nevertheless, there is a whole range of contemporary *dispositives* with a broad palette of inspiring programs. The last explosive technical, social and cultural developments after the 90s have brought forth an amazing richness of programs, some adapted from other modern and successful *dispositives*. Information retrieval from the wireless Internet represents a rewriting of the one in classical Internet, but with a focus on place and time related information. The quasi-dialogue through SMS copies the fast written conversation of Internet Instant messaging and less of E-mail, which are technicised avatars of the earlier *dispositives* of written communication (letters, post) themselves. Lately, MMS, being used mainly as a wireless camera, represents an adaptation of photography programs. Maybe the most intense adaptation and re-writing activity happens in the entertainment frame of mobile telephony, which is now a complex puzzle of music, video and games programs.

The appropriation of programs from other *dispositives* does not mean copying and simple accumulation. In mobile telephony, these programs are creatively combined and changed by users and engineers, so that, in the end, they look otherwise like in the previous avatars or competitors. Several present programs can be highlighted, such as: temporal management

through the mobile assistant/office; communication in the conversational sense; spatial coordinative communication; availability management; location-based information; information for travel coordination; entertainment through music, games etc. The historical battle of *dispositives* is not a robbery, but a story of enrichment and creativity.

As a consequence of transformations in each *dispositif* element, the wireless communication, *dispositif* has been gaining in complexity. Its main usage structure, mobile communication started from the basic model of voice transmission through the telephone in the era of liberation from the domination of formal communication. Moderately long and elaborated formal and informal issues were transmitted. When radio waves allowed the free selection of places, this communication structure was significantly modified. The content turned into a mixture of private and public personal chatting and strongly coordinative indications for the efficient pursuing of the daily agenda in a very unstable, busy and interconnected life.

The management of communicative mobility promisingly began in theory with the wireless idea, but found its practical application only with the implementation of the cellular system and the miniaturized portable devices. With the rise of digital systems, the new structure enriched with a functional data transmission component, which opened the doors for various types of information for localization, orientation and navigation. Now, music and games programs build a promising entertainment frame. Future supervising or remote health monitoring will stay at the basis of specific usage structures with potential in the future.

3. IN-DEPTH EXPLORATION OF THE MOBILE COMMUNICATION *DISPOSITIF*: BASIC STRUCTURES AND MECHANISMS

3.1. Inside the *Mobile Communication* Frame

3.1.1. Specific Challenges of Mobile Communication

“Mobile communication”... These two words are so frequently used together that they are almost taken for granted. But if I separate them, the word “mobile” and the word “communication” are so full of meaning, that I cannot resist to question them and to try every significant permutation. With the coming of third generation mobile phones and personal communicators as new multifunctional wearable media, new ways of communicational behavior are emerging; namely, more and more cell phone users are performing distant calls or handling information while on the way. The *nomadic communication* (Flichy, 1999, p. 214) associated with wireless telephony usage features complex traits that challenge the common views promoted by communication theory in connection with interpersonal interaction. The syntagm *mobile communication* points thus towards a specific communication structure encountered in the usage of the cell phone while on the way, comprising of: exchanged contents; purposes; communicative actions/situations; partners and their interaction. Each of them is specific, different from the ones of the concurrent media, because it is influenced by the possibility of changing places while communicating and by other internal structural facilities and constraints of the technology. I should quickly note that, in this thesis, *mobile communication* corresponds to the program of expressive and social communication accomplished through the usage of verbal telephony and SMS. On the other hand, in our times, movement in the space seems to serve an urge to communicate or to get information at the expense of other actions or states. If we reverse the topic, *communicative mobility* in wireless technology usage points towards a type of movement behavior encountered when someone travels or changes places while communicating. User’s movement either derives from a given communication or information action, or it is oriented towards the fulfillment of a communication/information purpose. The emphasis here is more on the exploitation of space while using the cell phone, *travel patterns, communication places, orientation, temporal, and spatial perceptions*. In the *dispositif* model presented in the previous chapters, *communicative mobility* represents the way that users manage their movement by exchanging coordinative spatio-temporal contents or by accessing information, orientation, and localization programs.

In this chapter, focus will be placed mainly on the comprehension of the communication structure in the mobile *dispositif*. The range of perspectives that help to understand the specific mobile communication elements, flow, and usage patterns will be analyzed, with emphasis on their theoretical and methodological advantages. While the analysis of mobile communication can benefit from the findings of the numerous communication theories, the spatial behavior of cell phone users and their relation with technology will be examined by means of an empirical quantitative study conducted on users and non-users, presented in the last part of the thesis.

First of all, it should be noticed that the new communicative structure brought forth by wireless telephony usage evolves in relation with the already existing structures, created by

other media and forms. Ideally, this aims to simulate the face-to-face communication through the induced sensations of proximity, simultaneous exchange of replies, and in more recent times, video clues. However, mobile telephony is not limited to the simple technicisation of face-to-face conversation, trying to creatively appropriate and re-build other electronically mediated communicative structures. In its history, mobile communication coexisted for a long time with other forms of communication and sometimes competed with them, so that its analysis should be put in relation with them. As presented in Figure 1, three communication paradigms-verbal, written and iconic-furnished construction bricks for a new integrative medium: the current mobile telephony. This convergence highly stimulates the research interest.

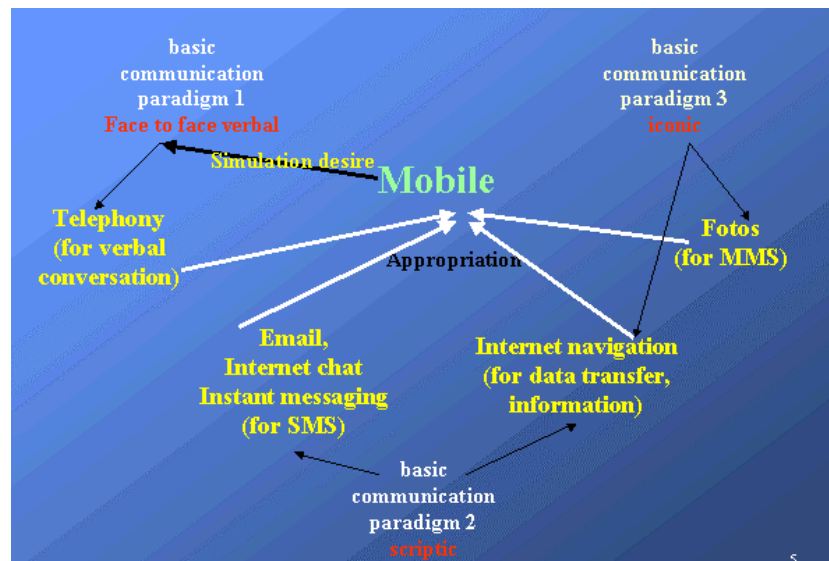


Figure 1. Construction “bricks” for mobile communication

The comprehension of the elements and flow of mobile communication may benefit from the research conducted in the vast field of communication and media studies. Communication and media theory produced, indeed, valuable ideas and models, which can be very useful for the comprehension of the mobile communication process and for the construction of explanatory schemes and models in this field. Unfortunately, as Katz and Aakhus outlined, in many such theories, there was a tendency to ignore the role of the technology itself in communication, except as a communication medium and to examine, even in mass media studies, the effects of the media rather than the internal structure of the media themselves⁴⁷. Communication experts have largely ignored the telephone and particularly the mobile phone (with some notable exception such as Hopper (1992), Fischer (1994) and Schegloff (2002)). According to these authors, the low importance attributed to technology in the communication process can be explained by the fact that the media of every-day life were simply taken for granted, “so that even Goffman, the most astute observer of the routine and the mundane seldom talked about the telephone communication” (Katz, Aakhus, 2002, p.10). The sociology of communication manifested little interest in the use of personal communication devices and was much more seduced by mass-media effects of computer mediate communication. Its field of study must be, however, extended to the study of mobile communication, because, as Katz

⁴⁷ “Upon reading literature on communication technology, one might think that communication technology is a television or a personal computer linked to a network. Further investigation would lead one to think that the purpose of the technology is to deliver entertainment packaging or to make organizations more efficient and attractive” (Katz, Aakhus, 2002, p10).

and Aakhus maintained, “mobile telephone is a technology that can sharply illuminate human communicative behaviour” (Katz, Aakhus, 2002, p.10).

Since the analysis in this thesis goes far beyond information transmission and communication elements and tries to clarify particularly the relationship between the human subject as user and creator and the mobile communication technology in the daily usage, the classical mechanistic frame of communication theory, with its gallery of behaviourist and functionalist models, proves to be insufficiently broad and flexible to explain interlaced structures like mobile communication and communicative mobility as particular spatial and communicative experiences, emerging from the interaction of technical, social, behavioural, and perceptive frames. The study of mobile telephony communication should be much more than an analysis of transmission and production of meaning.

Behaviorist models

The first communication models originated in the engineering research conducted after the Second World War on information transmission. In spite of the technical objective to quantify the amount of transmitted information, mathematical theories of information stimulated further attempts to define and understand communication from other various sociological, psychological and linguistic perspectives. By doing this, they also projected their own mechanistic standpoint on these views, leading to a long paradigmatic supremacy difficult to surpass. It should be recognized that the first generation of linear models based on Shannon & Weaver’s scheme is helpful for the comprehension of the main elements of the mobile communication. Indeed, this includes: a source, which produces the message; a transmitter, which encodes the message into signal; a channel, to which signals are adapted for transmission; a receiver that “decodes” (reconstructs) the message from the signal; and a destination, where the message arrives. Within the same linear paradigmatic frame, communication research in Europe focused more on the analysis of language as a support of meaning. The structuralist perspective emphasizing the idea of interrelation extended upon all the systems of signs (structuralist semiologies) and further on anthropology, psychology and philosophy. Despite some notable achievements (among them the Jacobson’s), structuralist linguistics disregarded the meaning attributed by communication partners to the communication act. However, this dimension, the meaning of the communication act, represented the focus of the late behavioristic orientation preoccupied by the relations between symbols and the human behaviour. The early behaviourists emphasized the importance of the purpose of communication, thus reinforcing the persuasive effect of communication. A strong linearity characterized the passage from stimuli to reaction, as a relation cause-effect institutes, in which parts are distinct and the process sequential (Lohisse, 2002, p. 66). However, this instrumental and linear representation suffered transformations under the influence of Morris, who advanced the pragmatic perspective of studying the relationships between signs and their users. The novelty brought by Morris is the idea that the communication meaning resides more in the relation between communicators, rather than in language. Behaviourist researchers produced several interesting models of interpersonal communication. Berlo’s SMCR model focused on the psychological nature of interpersonal communication (1960). Barnlund’s model (1970) attributed an even greater importance to the human communicators, maintaining that interpersonal communication represented a transaction in which the communicators invent and attribute meanings in order to accomplish their goals (Lohisse, 2002, p 74). Within the empirical orientation, various models have been constructed in order to understand mass media communication: the Lasswell scheme (1948);

the two-step flow of communication model of Katz and Lazarsfeld (1955); Westley and McLean's model (1970); the models of Moles (1967) and Gerbner (1955⁴⁸, 1995).

Functionalist explanations

Several empirical models and theories about communication emerged from the general functionalist frame dominant in the USA. With direct application to mobile communication, one of the most productive functionalist theories was *uses and gratifications*. *Usage and gratifications theory* originates in the larger mass of selective influence theories, the particular field of social differentiation (DeFleur, Ball-Rokeach, 1989). At its basis is the idea of an active user, who selects the transmitted message (of mass-media). Although it has a long research history (its beginnings can be traced in 1930), this orientation represents still a widespread strategy for understanding the active role of the users. Ling (2001) gives some examples of studies on mobile telephony based on this theoretical frame. He began by observing that one might expect other gratifications to be sought from mobile voice services than traditionally sought from fixed telephony. As Pedersen and Nysveen outlined, Leung and Wei (2000) found seven gratifications of the mobile phone; "fashion/status", "affection/sociability", "relaxation", "mobility", "immediate access", "instrumentality" and "reassurance". Thus, gratifications related to fashion, relaxation and entertainment, flexibility and mobility were identified in addition to traditional telephony gratifications identified by Dimmick and Sikan (1994), Pedersen and Nysveen (2004). In the German area, Höflich and Rössler (2001) identified the following gratifications: "reassurance" (*Rückversicherung*), "sociability" (*Kontaktpflege*), "immediate access/availability" (*Verfügbarkeit*), "instrumentality" (*Lebenshilfe*) and "entertainment/enjoyment" (*Nutz-Spass*). Another interesting study concerning SMS communication summarized survey results of SMS usage and gratifications gathered so far (Döring, 2002). To explore the communicative functions of SMS, not only on the basis of the users' statements but also on the basis of the message contents, a corpus of N=1,000 authentic SMS texts was collected and analyzed. It turned out that SMS messages served specific social networking functions (appointments, media choices, greetings, phrases) and perform co-orientation and coordination tasks (position reports, practical support offer s/requests). As further asserted, one of the main findings of uses and gratifications research is that gratifications of mobile services go beyond those sought by traditional telephony and by traditional messaging services like e-mail. Unique gratifications are those of "availability", "enjoyment" and "status" or "expressiveness".

As a reaction to the functionalist perspectives, critical theories of the ideological effects of the media developed, claiming that mass media opposed to social change and transformation and aims to maintain the status quo. This line extends up to the present, but with the focus changed on critical examination of communication technologies. It may represent a productive line of research for a critic of the negative effects of the mobile telephony on communication and interaction.

Different from mechanistic perspectives, the organicist communication theories study communication as a dynamic assembly of relations among elements (Lohisse, 2002 p. 113). The emphasis moves on connection, relation, and interaction. Within this perspective, communication is defined as a dynamic system that establishes interactive relations among elements together with interactive relations within the global context. Communication models constructed within the systemic thinking frame are accordingly circular and complex, interactive, holistic and relational. The communication system is also an open system, in which subjects, contexts and common uses are closely related (Lohisse, 2002, p. 113). It

⁴⁸ The model advanced in Gerbner's doctoral dissertation, "Toward a General Theory of Communication" is here implied (1955).

should be said, in particular, that the social systems theory, with its concepts of self-organization, self-referentiality, autopoiesis and reflexivity has been the subject of intensive discussion and has opened new integrative perspectives in the communication theory. Two main comprehensive models were formulated by system theories in order to understand the communication process: the feedback and the positive and negative retroactions.

Systemic explanations alone are insufficient for the comprehension of structure re-build of communication and movement in mobile telephony usage. If the systemic approach to communication is compared with the one of the *dispositif* described in the chapters before, it can be observed that some elements and strategies are common, but others are distinctive. Shared points are the insistence of the interrelation among the networked elements, the "network structure" - a certain organization of the internal elements to obtain stability. Distinctive is that the classical holistic systemic theory focuses on the arrangement of and relations between the parts which connect them into a whole, which is independent of the concrete substance of the elements (mobile phones, technical infrastructure, people, etc)⁴⁹. Usually the abstract organization of phenomena, independent of their substance, type, or spatial or temporal scale of existence is described. (Heylighen and Joslyn, 1992). On the contrary, in the *dispositif*, particularities of the elements and of their disposition stay in the foreground: the way the inner structure of the technology and the subject interact according to various programs. Communication results from a spiral relation among technology, subjects and programs, also influenced by periodic changes in the general social and cultural frames. Therefore, although I believe that systemic models have high explanatory value, they can only partly account for the comprehension of the mobile communication structure re-build.

Important issues, such as: mobility while communicating, perception of the "communicative environment", representation models, multiple uses and facilities integrated in a real multi-functional technology, together with the necessity to introduce the technological dimension within the communication process, have made me be less satisfied with the means provided by the aforementioned stances and look for something else that is more flexible. I should, however, admit that the selection of another concept that may explain communication does not decrease the value of communication theories and models, whose findings have to be integrated in the *dispositif* model. The classical theory of communication: sender-message-receiver (focused on the transmission dimension within communication) should be combined with pragmatics (studying relations and the manner the *dispositif* positions its subject) and the recent cognitive theories exploring the mental imagery, so that a complete image of communication, information and orientation within the *dispositif* may be obtained.

⁴⁹ Francis Heylighen and Cliff Joslyn, 1992, Cambridge Dictionary of Philosophy, Cambridge University Press, available online on <http://pespmc1.vub.ac.be/SYSTHEOR.html>.

3.1.2. Basic Elements and Flow of Mobile Communication

If a short characterization of its content and expression is needed, communication carried over the mobile phone is mainly verbal, short, coordinative and assertive, avoiding explanations and long clarifications (Cornita, 2001). From this perspective, it may result that mobile communication is “poorer” than face-to-face conversation, which simultaneously uses verbal means, paralanguage, and non-verbal means (gestures, mimic, body position, physical contact, extra-corporal objects, and proximity); has higher redundancy; and it is usually emotionally charged. However, technicisation processes have enhanced its complexity, enriching its forms of expression. In mobile telephony, the written SMS is gradually catching up with the spoken communication. Recently, new features like photo transmission and multimedia messages stay at the basis of a promising “iconic” communication, which transmits information about the surrounding context together with visual cues about partners.

As previously stated, various communication models have been constructed in order to describe and explain the communication flow and elements in general. They can be useful to identify the main elements of the *mobile communication*. By and large, mobile communication (verbal, written or iconic) represents a mediated form of interpersonal communication, comprising the main elements of the transmission models: source, message, channel, and receiver. Note that this simple structure is only schematic and should be amended by taking into consideration the constant shift of meaning that the actual usage of mobile telephony produces; the context (intrusion into the public space); the influence of the medium, or the relationship between sender and receiver. Interesting in the technology usage is that, in the absence of one interlocutor, communication turns into information retrieval or even the retrieval of a missed communication loaded on mailbox.

The mediation of communication through technical devices in mobile telephony means that an interpersonal communication of a conversational type (verbally, written) superimposes over another type: communication between technical devices. The "shadowy" technical elements and frames controlling the channels, routes and directions are engaged in a sophisticated *extra-personal communication* (communication between machines and interfaces) that makes content exchange and interaction possible. For example, the "taken-for-granted" mobility is in fact achieved through the internal communication among control devices: mobile phones, base stations and a mobile switching center. Each mobile phone communicates with the other phone via the base station and the mobile switching center and, as the user travels, the signal is passed from cell to cell. More details of the extra-personal communication flow are presented below:

0. The user decides to initiate a call
1. The phone is powered up and is listened for a SID on the control channel
2. The phone receives a SID and compares it to the SID programmed into the phone. If these match, the phone knows that the cell it is communicating with is a part of its home system.
3. The phone sends a registration request to the Mobile Switching Center (MSC), which keeps tracks of the phone's location in a database.
4. The MSC gets the call and tries to find the source in the database aiming to identify the cell.
5. The MSC picks a frequency pair that the phone will use in the cell to take a call
6. The MSC talks with the phone to tell which frequencies to use, the phone and the tower switch on these frequencies and the call is connected
7. As the communicator moves toward the edge of the cell, the cell's base station notices that the signal is diminishing. In the same time, the station in the cell the phone is moving toward will see the phone's signal strength increasing. The two base stations coordinate each other

- through MSC and, at some point, the phone receives on the control channel, telling it to change frequencies. As the user travels, the signal is passed thus from cell to cell
8. If the SID on the control channel doesn't match the SID programmed into the phone, the phone knows it is roaming. A communication between different superior MSC's is established over the validity of the phone's SID.

A combined schema that integrates both interpersonal communication and extra-personal communication (communication with machines and interfaces) can be imagined and built. A possible third member can be included in communication. The schema is modified accordingly.

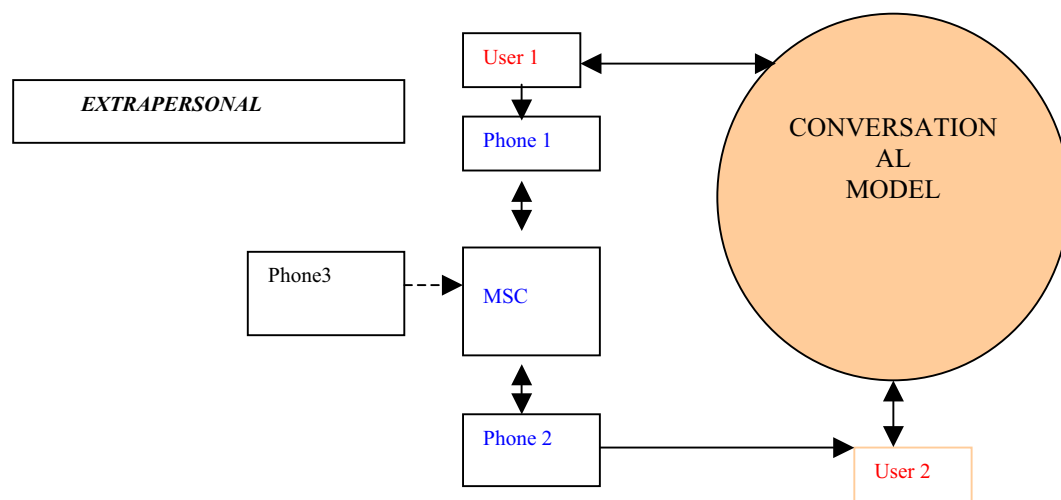


Figure 2. Interpersonal and extra-personal communication frames

How do interpersonal communication and extra-personal communication (from the part of the apparatus element) intertwine in the *dispositif*? Although communicators seem to be not really aware of the complexity of the underlying system, many of its elements slide into the general representation about the communicational environment. Communication is performed in a virtual sound and graphic mediated "conversation room", which main representation is that of users who can physically move while communicating with one another in a space with expanding boundaries. Topological elements like *coverage area*, *cells*, abstract ideas about *mobility*, *ubiquity*, *artificiality*, *immediacy*, attitudes towards *control*, *safety*, some *time and cost constraints* are highly relevant for communicators, because they structure the initiation and pursuing of interpersonal communication, also influencing the way that users exploit the physical space when performing private or professional tasks.

The extra-personal communication emerging from the complex internal organization of the mobile technical infrastructure has distinct features in comparison with interpersonal communication. While human communication emphasizes de-fragmentation, machine communication seems to privilege form; organization; hierarchy; and design over anarchy; anti-form; and chance. As a consequence, some of the former "classical" models of communication (the so-called information transmission models) could be appropriate to understand extra-personal communication, while different approaches are needed for interpersonal communication in its conversational form.

3.1.3. Studying Relations in Mobile Communication: the Mobile Dialogue as a Form of Social Interaction

As Rule (2002) outlined, by the end of the twentieth century, mass society models appeared less salient and a new set of images and concerns engaged our attention, namely particularizing communications. These communications are not standardized, one-way transmissions, but exchanges of highly specific, interactive data between individuals and organizations. (Rule, 2002: p. 242) The emphasis moves therefore on individual communications, or on how users employ individual means of communication. This general orientation marked the turning point from which communication and media theories can be directly of use for the methodology of studying interaction and relations in the *dispositif*. Although not part of the theoretical frame of the thesis, these directions proved to be indeed very productive for the methodology of empirical studies of mobile telephony in everyday life⁵⁰.

Another fruitful direction for the study of mobile telephony derives from the pragmatic orientation: the conversational linguistics. The central intuition of the linguistic pragmatics is that the meaning resides not in words and sentences, but in users' intentions, who formulate words and sentences and change them between them (Bougnoux, 2000, p. 80). The dialogue becomes a central concept in this approach. This can be generally defined as a real and active presence of at least two communicators who alternatively play the role of speaker and receiver and who, through their communication exchange, lead to the progress of quantity and quality of information transmitted by language or visuals. In addition to the general communication schema, the dialogue implies the existence of adjacent pairs that make the content exchange possible. Conversation is thus a current and familiar type of oral dialogic communication in which two or more participants freely play the role of source (Levinson 1983, pp. 284-285). It is continuously created by the interaction of persons who have generally different conversational objectives and, sometimes, divergent interests. Conversation is also inherently contextual, the context creating conversation and being produced by it. Finally, the conversation is structured; that means that it looks like a sequel of interventions during which the two types of roles - source and receiver - continuously update and change the places (some members of the audience are intentionally or by contingency added). Consequently, the main objective of this theory is to outline its organizing principles: order of sequences, openings and endings, etc. (Lohisse, 2002, p. 179)

From this perspective, modern telecommunication technologies have always tried to make the dialogue as close as possible to the un-technicised paradigm (the face-to-face dialogue) by artificially simulating closeness and simultaneous exchange of replies. The traditional face-to-

⁵⁰ For instance, Puro (2002) followed Goffman's perspective and observed that the mobile phone could be regarded as a new stage where the mobile society is acted out. His observation that mobile interactions are not necessarily deep raises questions about the freedoms and burden that come with this new interactional stage. Thus, a mobile phone can represent "a place where one can go and chat about anything. With a mobile phone, one can feel that one is in a place where emotional arguments and friendly laughter for example, are appropriate. It is a stage that resembles a virtual cafeteria or marketplace where people meet each other" (Puro, 2002, p. 27). Within the same frame, Licoppe and Heurtin studied the role of mobile phones in managing distant interactions, with focus on trust and negotiated local context together with construction of bonds and commitments (Licoppe, Heurtin, 2002, pp. 94-109). The question of cultural differences in mobile telephony usage and of mobile subcultures constitutes the subject of an entire chapter in "*Perpetual contact. Mobile communication, private talk, public performance*", where Puro, Fortunati, Kim, Robbins & Turner, and Mante studied various aspects of local communicative culture when confronted with mobile telephony usage.

face dialogue is made possible by verbal means; the paralanguage and the non-verbal means, i.e., body language (gesture, mimic, body position, and physical contact); extra-corporal objects and proximity. In face-to-face dialogue, verbal and extra-verbal means are simultaneously used, and that influences the structure of the linguistic expression. On the contrary, the telephonic conversation is not redundant, lacks visual cues, has poor feedback (except for the call-backs), and it is relatively short and stylistically poor. The reduction of feed-back to verbal expression and to paralanguage (intonation, accent, laughing) leads to the loss of a great deal of direct speech naturalness. More exactly, jokes, ironies and euphemisms are rather poorly received and comprehended. Consequently, the linguistic context becomes much more important, and the supra-segmental elements try to compensate the other means of non-verbal communication. Spontaneity, combined with real-time speech, makes phone dialogue similar to natural dialogue. However, the temporal and spatial restraints do limit linguistic creativity, connotation being overruled by denotation. Everything must be transmitted more clearly, faster, and more efficiently, using only the means the audio channel provides. In some cases, the so-called unelaborated enounces from face-to-face conversation become elaborated transpositions of verbal messages. This impression of liberty and ubiquity could sustain the linguistic creativity of the speakers, but without substituting the importance and relevance of the visual contact. Mediated dialogue leads thus to a change in the communication structure (Cornita, 2001).

One of the most important contributions to the comprehension of phone-mediated verbal dialogue was brought by Schegloff (2002). His work, *Opening sequencing* (2002) offered a variety of themes and analytic tasks, such as: the positioning of objects within a turn and the organization of a turn; an orientation to sequences of sequences; the ways in which interactional practices and constraints set the context; and limitations on unilateral determination of interactional outcomes. In two-party conversations, the speaker sequencing is alternating- a specification of a basic rule - *one party at a time*. Also, when many members are gathered in a discussion, they are said to have a single focus, and this does not involve a number of conversations proceeding at the same time. The *abab formula* operates on an utterance-to-utterance basis: the completion of one speaker's turn serves to occasion a transition to the next speaker's turn, leading to two associated problems:

- a termination problem;
- an initiation problem (how they manage the coordinated entry by two parties into an orderly sequence of conversational turns).

Schegloff's study mainly focused on the *initiation* problem in telephone conversations. Both question-answer and summon-answer were analyzed, but the emphasis was placed on the problematic nature of the summon-answer sequencing. This particular analysis of summon-answer (SM) sequences led to a modified view of availability in telephonic conversations, "better thought of not as "a state of the other with respect to the prospective conversation, as that is the initiator 's business to figure out and be controlled by', but rather as a matter of 'relative states' of the prospective initiator and his intended co-participant, each assessing the prospects of initiating a conversation, and each oriented to the other's assessments in doing his own" (Schegloff, 2002, p. 368). The analysis should consider the characteristics of the instant case; the present possible co-participant; the currently on-going and possibly prospective activities; the relevant formulated setting (the local situation); and the relative states and circumstances of the parties in it, not some absolute characterization of some candidate co-participant". His conclusion is that "availability is thoroughly interactional, not only in being a prerequisite to interaction, but in being interactionally assessed" (Schegloff, 2002, p. 369). It is also interesting that availability is "a matter of continuing interests

throughout the course of a conversation once initiated, and not only a condition for its initiation” (Schegloff, 2002, p. 369). It is well known that participants suspend their conversation when somebody’s phone is ringing. Members are also attentive to others’ “wandering attention, that is, their continuing availability throughout the course of an initiated conversation” (Schegloff, 2002, p. 369).

If we compare the mobile phone dialogue with other forms of conversation, this emerges as clearly distinct from the basic paradigm of the direct contact. While in face-to-face contacts, the physical presence of communicators implies multiple real time visual clues, clarifications, and feedback, mobile telephony is just the opposite: short, coordinative and assertive, avoiding explanations and long clarifications. Yet, many similarities between the classical telephone conversation and the mobile conversation can be found: speaking/hearing sequels, some openings and closings, and articulation techniques. Nevertheless, several important differences are present: the mobile verbal dialogue has stronger temporal limits, and it features context fluidization and a combined oral/written/iconic form of expression. In mobile telephony, SMS-written expression derived from the script paradigm is gradually catching up with the spoken communication. The SMS communication - a service based on the GSM (global system for mobile communications) technology – permits, among other things, an interpersonal exchange of electronic text messages with a maximum number of 160 alphanumeric signs over the mobile phone. Because it involves a response delay or even no response at all, communication via SMS can only metaphorically be regarded as a “dialogue”; it is however, in most of the cases, a fast exchange of written messages. The rapid turning of a spoken message into a written one imposes to the speaker a new behaviour pattern under the rule of the elaborated composition. Over-elaboration is striking, even for colloquial language. The extra-verbal means, already limited by fixed telephony, are followed by paralinguistic elements. What remains is a short, concise and condensed written text. In order to transmit emotional cues, other stylistic means of written communication with more salient communicational functions are needed: various punctuation marks, exclamation marks, question marks, etc. In recent years, a new feature has been included in mobile telephony, which enriches the capabilities of the medium: photo transmission and multimedia messages. Featuring an in-built camera, a radically enhanced user interface and large color display, 3G mobile phones open up new perspectives in personal communications. A digital camera and multimedia messaging (MMS) functionality are combined to capture and share moments instantaneously. From this new facility, a new type of iconic exchange seems to emerge.

Taking into consideration the aforementioned considerations, I think that the complexity of *mobile conversation* calls for an interdisciplinary approach within the dialogue theory frame. Starting from a communication model advanced by Eugenio Coseriu (2000), Georgeta Cornita (2001) considered that the dialogue analysis relates to the following dimensions: communication as an activity, as a technique (or communicational competence) and as a product the “realized communication (what is actually communicated) (Cornita, 2001, p. 38). At the historical/universal level, one should study the communication into a historically determined language. Here, structural linguistics would be sustained by communication history, semiotics, anthropology and sociology. At the individual level stays: (1)-the communicational act, (2)-the dialogic competence or the science of building a communicational sequel and (3)-the communicational sequel of an allocutive or conversational type, recorded or consultative or, in other words, the enunciation as a communicative performance. Here, pragmatics, linguistics, semantics, semiotics, and proxemics meet psychology, sociology, anthropology and philosophy to explain the

complexity of the realized communication. Studying communication techniques in mobile telephony calls on sociology, psychology, anthropology, semiotics and proxemics.

The activity of mobile communicating points towards a collection of born and acquired capabilities: to be able to interact with someone; to articulate; to speak a language; to use non-verbal means (laughing, crying, pauses); to use mimic, gestures; to move hands, to type; to use the environment; to travel; to keep the handset in hands, etc. But one cannot communicate without the technique - the technique of speaking, of using extra-verbal means and the technique of discourse construction. Mobile conversation requires specific techniques next to the ones specific to the face-to-face dialogue. General communicative skills, such as to articulate loud and clear and to master the techniques of short textual construction, are completed by technical competencies to use the numerous functions and applications of the mobile handset, of fast typing, and the ability to construct an advantageous private place of communication in the public space.

Communication competencies allow the obtaining of end products, which are verbal (arbitrary) and/or graphical (analog) messages. In terms of interactivity, mobile communication can be bi- or multidirectional (teleconferencing) and can proceed in real time or differed time (listening to voice messaging, read SMS, email), etc. The extra-verbal means play an important role in the cell phone dialogue, particularly when the mobile conversation interacts with an already running face-to-face communication. The informal or formal context; the co-presence of other communicators or of non-users; the degree of audibility of the partners; the degree of cross talk; the overlapping of the received and transmitted messages are also important and have to be taken into consideration. For instance, Geser identified in his study, *Towards a Sociology of the Mobile Phone* (2003), several reasons why cell phone calls have a highly negative, destabilizing influence on ongoing face-to-face interactions⁵¹. An increasing segregation of verbal and visual gesturing manifests when verbal mobile conversation interacts with the direct contact (Geser, 2003). If other interlocutors are present, and a cell phone conversation has to be conducted, cell phone speakers “engage in highly elaborate forms of verbal behavior, thus increasing the risk that involuntary eavesdroppers become uneasy about overhearing what they are not supposed to hear.” (Geser, 2003, online citation). In order to reduce such disruptions, partners may choose to intensify communication on the nonverbal level by engaging in more “face-work” and amplifying the frequency and lengths of mutual gazes (Geser, 2003, online citation).

In terms of discourse, the informal wireless verbal communication is a great builder of "*petites histoires*"; coordinative "keep in touch" messages; localization; jokes; and in some cases, just conversational "trash" (however, this apparently minor last topic should not be

⁵¹ He said that: “The calls typically occur at unpredictable times, so that they cannot be anticipated and integrated into the local discourse. Deeply anchored norms and habits usually demand that calls are answered at the moment they come in, so that local interactions are disrupted even at highly critical moments. As a consequence, even the mere presence of a cell phone in a group can produce irritation (...) When an individual is answering a call, he or she gets involved in a bilateral communication process completely segregated from the local interaction field for purely technical reasons, because other bystanders cannot see who is calling and cannot hear the caller speaking. Therefore, all possible reactions to incoming calls (flight, suspension, persistence) are likely to disrupt the ongoing social interactions. In all circumstances, a situation of normlessness and insecurity is created, which tends to increase when the conversation endures and its total length cannot be anticipated. Reinforcing these technical conditions, there is another deep-seated habit to focus attention completely on the communication with the caller (e.g. because calling time costs precious money and therefore has precedence). Thus, answering a phone call means disengaging oneself psychologically from the discourse at least on the level of verbal communication” (Geser, 2003, online citation).

underestimated because it helps building human sociability). Professional communication is mainly dedicated to the management of business mobility or the accomplishment of specific work tasks. The organization of discourse is also highly context-dependent and is often improvised, being some kind of happening or performance. In many situations, cell phone communicators are constrained to react very quickly, without a careful elaboration of the answer. This real-time situation almost approximates the face-to-face conversation, though important differences still exist. The contextual versatility created by the mobile call has a significant influence on the strategy of communication or information accessing, because communicators place themselves in a variety of situations and contexts that create new communication issues.

3.1.4. Mental Construction of the Mobile Communication Space in the *Dispositif*

In the mobile communication *dispositif*, *mobile communication* and *communicative mobility* meet and interlace within a so-called mental mobile communication space. Since I am going to largely confine myself to the analysis of “real” communication, movement and other usage patterns in the forthcoming empirical chapters, I would like to focus now on the construction of this conceptual mobile communication space.

One important question in this matter is how users mentally *arrange* and exploit the surrounding space while performing mobile communication. Spatial reasoning is a key element in a mental model construction. Research in this area basically deals with the formal models of the common-sense geographic world, the so-called "naive geography". Barbara Tversky, in particular, performed a comprehensive analysis and classification of spatial representations, saying that people engage in a variety of inter-related spaces: the space of the body; the space around the body; the space of navigation; and the space of diagrams (Tversky, 2001). She basically maintained that people's mental representations of these spaces are constructions based on the experience they have of their bodies interacting in space, rather than on their internalized perception of space. The space of the body is thus perceived as “naturally divided into parts, varying in size, perceptual prominence or functional significance” (Tversky, 2001, p.1). As Tversky pointed out, the speed of identifying body parts depended on the signification of the body parts as indexed by the representations in the sensory-motor cortex rather than on size. A broad illustration of the structured spaces surrounding the mobile user is given in the Figure 3 below:

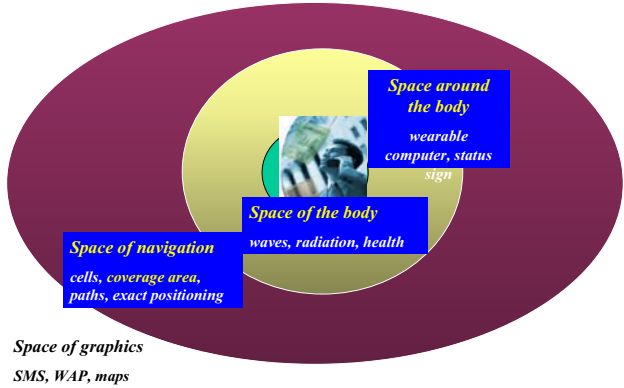


Figure 3. The user in multiple spaces

The intrusion of the mobile phone into the space of the body first manifests itself through health concerns associated with cellular phone usage. The head is perceived as the most sensitive to the harmful effects of technology because it can be traversed by the invisible radio waves. Moreover, the mobile phone could metaphorically act as an extension of the bodily capabilities of communication - vocalization and hearing - which are located in the upper part of the body. This extension and appropriation represents a technification marker coming from the times of the fixed telephone.

Next comes the space around the body, which is the space of things that can be seen from the current vantage point (Tversky 2001, p. 2). It is conceived tri-dimensionally from a coordinate system based on extensions of the three major body axes: head/feet, front/back, left/right (Tversky 2001, p. 2). Included in this space, the mobile phone can act as a status sign or a group marker, and it is a part of the presentation of the self. Moreover, being endowed with some data transfer capabilities, the mobile phone is sometimes represented as a – still limited – wearable computer (i.e., a computer that is subsumed into the personal space of the user), which enables people to have access to *wearable collaborative spaces*; the portable system can be used to support collaboration within a so-called communicative-collaborative space created between remote users (Billingshurst et al., 1998).

The space of navigation, which proves to be crucial in understanding the mental representation associated with mobile telephony, is the space users explore (Tversky, 2001, p.3). This is schematized into paths and landmarks relative to reference frames, which allow integration of fragments into the whole. Unlike the space around the body, the space of navigation is generally conceived as bi-dimensional (Tversky, 2001, p.3). In cellular telephony, the space of navigation is where mobility reigns. Users move within cells or from cell to cell within a larger coverage area in order to communicate with one another. As a matter of fact, mobility is made possible by a sophisticated extra-personal communication between base stations and control centers, but users usually pay no attention to technical details. However, most users seem to be aware of the coverage area limits because of their past experience with signal loss in closed spaces or because of similar problems. An interesting question here could be related to the way in which mobile calls interfere with the actual navigation in space. Does a call initiate new calls, or does it save travel? Does it induce physical mobility, or does it limit it? A number of studies show that traditional/fixed telephony generates more trips than it saves. By contrast, mobile telephony may actually save travel time (Ling & Haddon, 2001). Last, the space of graphics proves to be important in order for one to understand how people exchange information in mobile telephony through SMS. Graphics use elements and spatial relations among them in cognitively natural ways to convey abstract information. When users build representations of the whole wireless telephony system, they integrate all these conceptions about multiple spaces and thus obtain a final composite structured image of multiple spaces surrounding them and their phone.

The behavioural “disposition” of communicative mobility leads to the construction of a particular “mental spatial disposition” that conditions the pursuing of mobile communication. More specifically, between users who move while pursuing communication, a sort of mental communication “room” evolves. It is mainly represented as unstable and versatile, resulting from the intertwining of a fragmented “navigation space of many inter-related places” and a conceptual “space of issues”. The communication intent and concrete physical locations are the main factors underlying this representation. As presented in Figure 4, the space of communication emerges inside the intersection of individual areas. Subject A communicates with subject B, and usually subject B replies and further communicates.

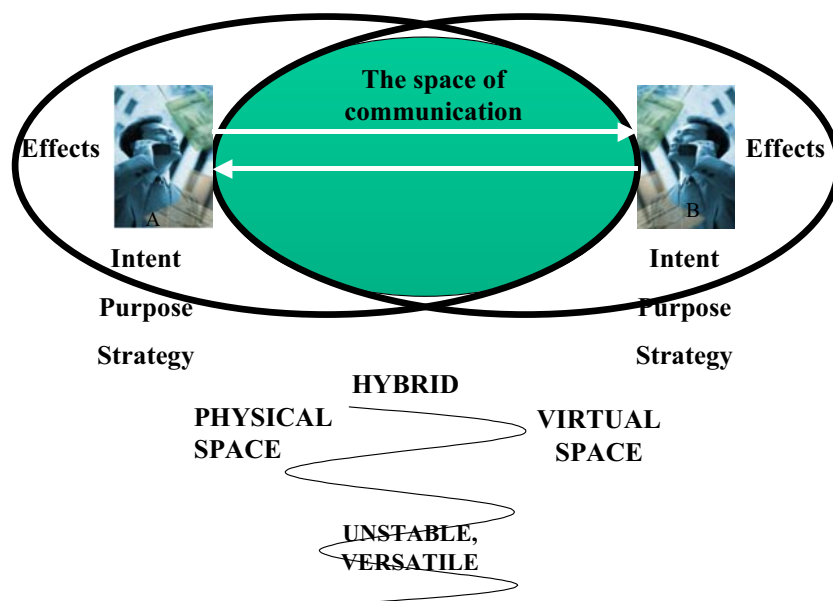


Figure 4. The space of communication

In both cases, communication is based on the existence of intention, purpose and strategy. For our purposes, that is to say, for the description of the mental model, the effects of communication are very important, since the mental space of communication is organized according to them. If the communication goal, and, therefore, the effect of communication on the receiver, is very concrete and place- and time-related (appointments, meetings, scheduling of visits, *come and take me*), the communication space is converted into a physical space, i.e., the navigation space. Users formulate questions, such as *Can I speak?* or *Where are you?* As a matter of fact, the latter is one of the most frequent questions in mobile communication, thus proving the users' need of exact localization in space. There also appears the issue of whether the user is located within the coverage area/has signal. If the communication goals are less concrete, the physical space is quasi-ignored, the mental space turning into a frame for overall communication. This hypothetical space can be called “the space of issues”. The communication space in mobile telephony is also versatile and unstable because communicators may very easily switch from navigation-related communication goals to chatting and vice-versa. Not only does this versatility come from the communication purpose, but it also derives from the mobility of the communicator in the physical space. Mobility in the physical space induces a strong fragmentation of viewpoints and experiences: one should react to various problems in various, ever-changing contexts. More specifically, as communicators are mobile, they place themselves in a variety of situations and spatial contexts, which create new communication issues.

While in face-to-face communication, the communication space is limited to the conversation room, being stable and clearly defined; mobile telephony takes place in a diffuse mental space for conversation, with unclear, ceaselessly extending spatial boundaries. An intermediary

stage of the mobile telephony conceptual space is perhaps the shared space, i.e., the media space⁵².

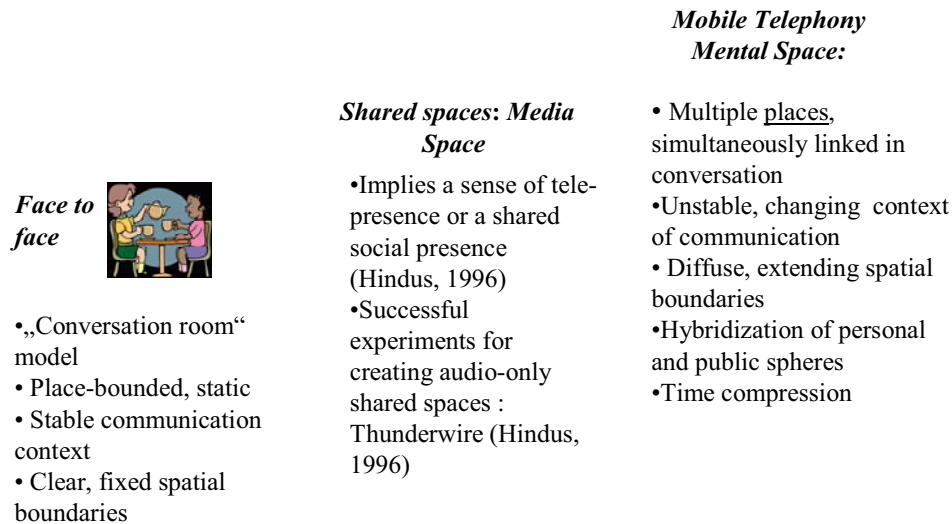


Figure 5. Definition of the mobile communicative space

Research indicates that the mental space of communication in mobile telephony can also be regarded as a hybrid space. In particular, Harrison and Dourish described the mixing of media and physical spaces as the creation of a hybrid environment, meaning that an interaction space is generated with hybrid properties of both the electronic and the physical world. Hybrid spaces are thus discontinuous with respect to both the electronic and physical worlds in which they are created. Spatial locations are ordinarily invested with social and objective meanings, which have to do with their ownership and usage, delineating sets of allowable and expected behaviours (Harrison and Dourish, 1996, pp. 67-76). In mobile telephony, this fact is proved by the high frequency of place-related communication, which reflects the need for precise localization in the physical space. Even when the question: *Where are you now?* is not asked, the interlocutor considers it implicit and gives exact details about his/her place in space. It is

⁵² The central question in media spaces is whether users have a sense of tele-presence or a shared social presence (Hindus, 1996). Does this happen in mobile telephony? Various studies carried out in relation to similar communication technologies (audio mediated communication) seem to support this view. To explore the potential of using audio means in a shared media system, Hindus, Ackerman, Mainwaring and Starr (1996) studied a workgroup using an audio-only media space. This media space, called Thunderwire, combined high-quality audio with open connections to create a shared space for its users. The two-month field study provided a multi-nuance understanding of the social use of the audio space, and the system afforded rich sociable interactions (id.). Experiments summarized by Sellen (1995, pp. 401-444), which were conducted comparing face-to-face, audio-video and audio-only communication, produced other interesting results. It came out that while people generally do not prefer the audio-only condition, they are often able to perform tasks as effectively as in the video condition. All in all, these studies reveal that previous work overestimated the importance of the video at the expense of the audio (Hindus et al, 1996). The optimistic assessment of mobile telephony as a media space, strongly featuring audio conversations, could by analogy prove to be accurate. However, the audio-written text interaction remains to be investigated in terms of how this brings about the feeling of shared presence in communication.

important to take this need for physical localization into consideration when talking pure virtuality and place-independent interaction in mobile telephony. It seems that the mobile communication space presents itself as a rather hybrid space of interrelated “places;” among them, users may switch while moving.

The existence of communication places invested with social and communicative meanings (like trains; street corners; foyers; cafes; restaurants; offices, etc.) makes the usage place (i.e. the spatial context) have a significant influence on the strategy of communication and vice-versa. For an in-depth exploration of the reciprocal link between the content and the context of mobile communication, a qualitative study was conducted in Romania in 2001⁵³. Here, 30 mobile users were given seven days diaries to fill in. Main analysis dimensions were: places where mobile communication was initiated; partners; length of conversation; communication intent; issues; and communication result (investigation of possible further mobility in space). Results provided some meaningful insights: in comparison to outdoor communication, diversity of issues in a home-initiated mobile communication was striking and could perhaps be explained by the higher privacy and better control possibilities. As can be seen in Figure 6, initiation of the communication from a fixed place is overwhelmingly associated with many tasks unrelated to space and time management: problem solving; plans; entertainment; sport; love; fun. Home communication, therefore, represents the portal of immersion into the above-mentioned “space of issues”.

Home Topics

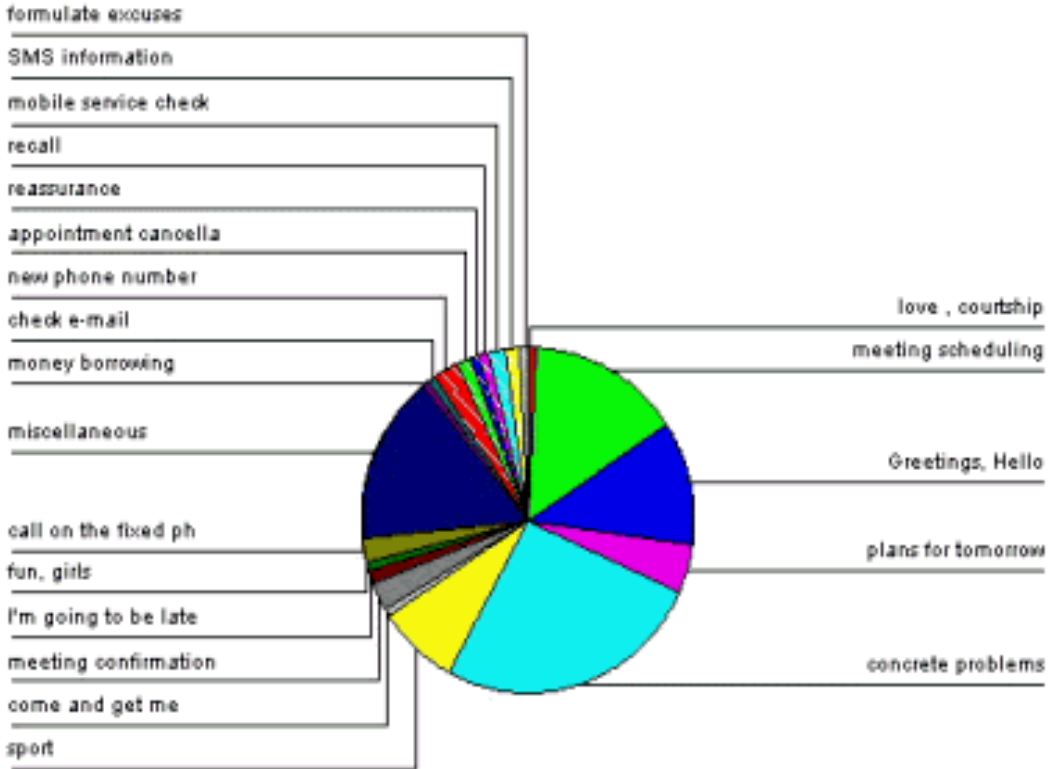


Figure 6. Home/fixed place topics. Main entries in the diaries in the category: *communication issues when the call is initiated from home*

⁵³ Georgeta Cornita, 2001, also Oana Mitrea, Georgeta Cornita, *Configuration of Mental spaces in Mobile Telephony*, online publication of the conference *Transforming Spaces*, Darmstadt, March, 2002.

On the contrary, communication initiated from a mobile outdoor place (Figure 7) leaves a bigger place for time and space management issues, being more connected to the space of navigation.

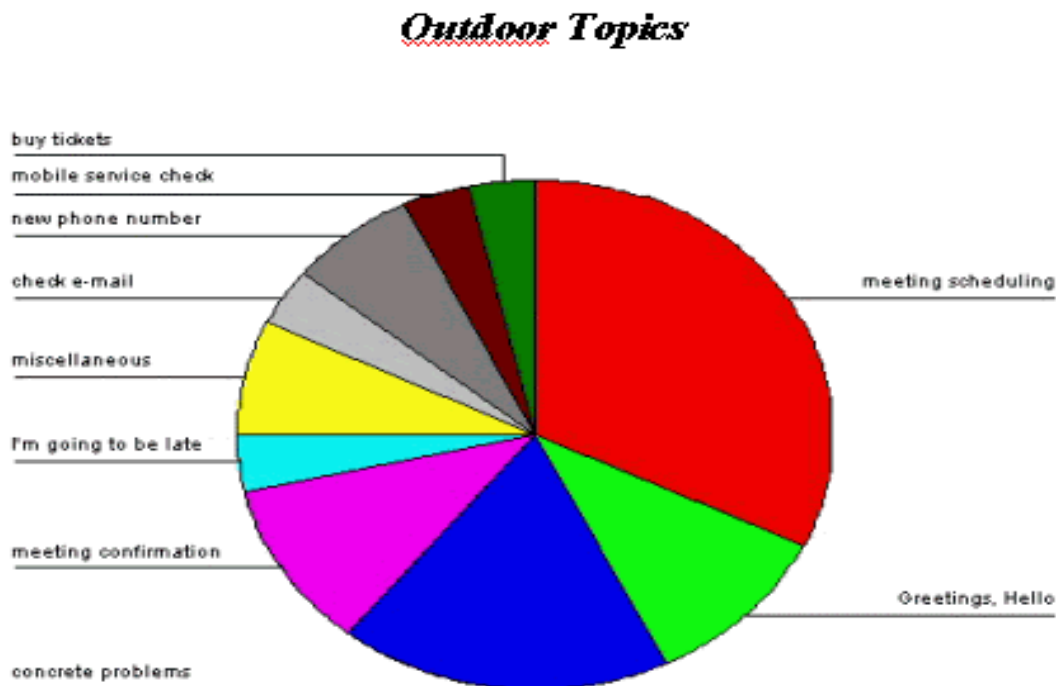


Figure 7. Outdoor topics. The graph represents entries in the diary corresponding to the category: *communication issues when the call is initiated from outside the home*

If the outdoor and indoor communication places are rather well defined, how do users represent the distances between them? Is the notion of distance dissolved, or even eliminated? Although we should accept that the distances between communication places in mobile telephony are somehow vague and "on the move", they are still present and meaningful. The interesting aspect here is that in mobile telephony, distance is often described in terms of time. It is converted into length, duration. Questions such as *How long does it take you to come here?* and answers like, *"I'm there in 10 minutes"* are very frequent and allow communicators to mentally approximate the physical distance between them. Precise time references are by all means very frequent in mobile telephony; the old "Take your time" (Tella, 2000) is being replaced by the supremacy of "now" and the tyranny of scheduling.

3.1.5. The Nature of Interaction in the Mobile Communication Space

The considerations above have introduced us to the theories dealing with the effects of virtuality, mobility and ubiquity on the type of social contacts and on the perception of the communication context, which are particularly useful for the comprehension of the nature of interaction in telecommunication. Concepts like cyberspace and networking and distance in the usage of new communication media count among the main achievements of this perspective. Authors like Virilio (1995) and Nirre (2001) emphasized the strong effects of telecommunication and information technologies, concluding that they have created special spaces (cyberspace) where distance and time are annihilated. On the other hand, other authors

like Böhme (2000) argued that direct face-to-face contacts are still preferred in many situations.

According to Nirre, overall distance can be understood both physically and conceptually: physically in the most literal sense⁵⁴ and conceptually, as that which renders a function of time. As the author said:

“Any physical geography could be mapped into a conceptual plane by a set of superimposed transformations: direct modification or technological adaptation. These transformations can be divided into: area transformations⁵⁵, linear transformation⁵⁶ and point-type transformation⁵⁷. The organizing principle of spatiality states that regardless of these transformations, the end result was always a conceptual plane - a space on which the subject and objects could be located, and across which they could move ” (Nirre, 2001).

In his opinion, transportation systems govern how the human form moves, communication systems, how it senses, and functional systems, how it acts. In the primitive state, a natural relationship exists between these facets: the self is the locus of concentric fields of increasing extension (where you are, what you can affect, and what you're aware of) on a single conceptual plane. Through electromagnetic technologies:

“The self remains in place but its presence is released along fluxes and wires that impose transformations so extreme as to be effectively infinite, the space under them not merely shrunk but imploded into points of hyperdense singularity. Within these points, space and distance are entirely annihilated. But there is still structure. This is the regime of the switch and the signal, of information, that most curious of substances that has no intrinsic properties and serves only to parameterize and configure the behavior of the system within which it operates“ (Nirre, 2001, online citation).

An interesting statement is that the new information technologies “make the distance dead, there is only connection”, with this idea bringing in the foreground the concept of networking:

“The principle of networking is superseding the principle of spatiality and large scale–systems we compose are progressively migrating to it. This vision implies some ontological shifts in the mental, physical and cultural areas: Mentally, it involves converting from a visual to a linguistic modality, from spatial to symbolic orderings, from fixed to fluid viewpoints, and from a centered to a fragmentary model of self. Physically, it involves reconstituting the body not functionally but within the domain of sign systems as a pure symbol, a screen across which difference can play. Culturally it corresponds to the elevation of differentiation and categorization as central principles. In the realm of knowledge, it involves sensitivity to issues of contextualization” (Nirre, 2001, online citation).

⁵⁴ As a space between places where objects can see each other and can participate in unmediated relations. (Nirre, 2001).

⁵⁵ An area transformation expands or contracts an entire area. When made by humans it corresponds to either a drastic alteration in the terrain (leveling forests, draining swamps) or to an ability or technology developed upon man himself (riding horses, surviving in the desert). As the latter, it is the most primitive type of transformation man applies to space (*Ibid.*).

⁵⁶ Linear transformations correspond to the construction of pathways, roads, canals and the like. They are more sophisticated than primitive area transformations, requiring the ability to modify the terrain and thus providing a potentially greater deformation, but are more limited in scope. (*Id.*).

⁵⁷ Point transformations occur when two points (but not the areas around them) are brought close together. They correspond to an engineering technology that transcends the plane, punching holes in it (airplanes, tunnels, bridges), and are the most focused (and hence powerful but restricting) of forms. (*Id.*).

Moreover, by means of the wireless Internet and SMS, communicators immerse in some kind of a cyberspace. This concept proves to be important for the analysis of mobile telephony infrastructure particularly because it challenges the definition of distance as a space between places where objects can see each other and participate in unmediated relationships. The web lacks space; therefore, menus and brand names become the central ordering principle. Nirre's other idea concerns the context of interaction: the web surfer interacts alone with objects or images while radio and television users experience, as a group, the area projected by the media. A new kind of virtual group dynamics is evolving from this particular experience. In this context, perhaps the most daring supposition is that the web provides access to information, not a community. Nirre also considers that:

“Visualization and virtual reality technologies will not create spaces but present maps and interfaces; one will use them but one won't be inside them, and neither will anyone else. Distances will be arbitrary and space will be vacated, selected and arranged according to whatever queries and filters one puts in place“ (Nirre, 2001, online citation).

Thus, maps and interfaces replace the “places,” and the estimable distances and human relations become diluted and empty.

No matter how seductive virtuality supporters advocate their point of view, one should carefully react to extreme positions concerning perceptions of the mobile communication space in mobile telephony. One can argue that, in the virtuality era, face-to-face contacts have not lost their fascination and verity. The fact of maintaining strong direct corporal relations in the telecommunication and virtuality era was advocated by Gernot Böhme in a recent article: *Leibliche Anwesenheit im Raum* (2000). The author recognized that:

“Für manche Analytiker mag es Paradox erscheinen, dass heute leibliche Anwesenheit ein solches Gewicht erhält. (...) Mehr und mehr definiert sich die soziale Existenz eines Menschen über seine technische Vernetzung. Er präsent nicht als konkrete Person, sondern als Anschluß. Homepage, Internetadresse, Mobiltelefon sind Voraussetzungen dafür , im gesellschaftlichen Spiel mitzuspielen. Für viele berufliche Tätigkeiten ist es im Grunde gleichgültig, wo sich die Person, die sie ausübt, gegenwärtig befindet, wenn sie nur irgendwie erreichbar ist. (...) Ist das wirklich so, ist das die Zukunft der technischen Zivilisation: eine gesellschaftliche Existenz ohne Körper oder wenigstens eine Existenz, für die leibliche Anwesenheit überflüssig ist?“(Böhme, 2000, p. 92).

Böhme's answer to this question emphasizes his belief in the power of face-to-face, direct contacts:

“Viele Fakten sprechen dagegen. Zunächst ist die Tatsache, dass das Reisen mit der Ausbau der Telekommunikation nicht ab-, sondern zugenommen hat. (...) Die Wirklichkeit sieht anders aus: Der Konsument begnügt sich durchaus nicht mit dem Bild. Er will da gewesen sein. (...) die Telekonferenzen, die technisch durchaus möglich wären, haben die Erwartungen nicht erfüllt. Man fährt, man fliegt, man will zusammen sein: face-to-face.“(Böhme, 2000, p. 93).

The author also highlighted one of the most important drawbacks of any virtual communication: the lack of reality due to a “stage“ effect:

“Telekommunikation ist immer kanalspezifisch, das heißt, daß die Kommunikationspartner immer nur über einzelne ausdifferenzierte Parameter miteinander kommunizieren. (...) Das hat

die zur Folge, daß die Kommunikationspartner füreinander bloß erscheinen, wie Schauspieler auf der Bühne.“(Böhme, 2000, p. 95)

One can ask how disturbing the sensations induced by this artificiality are. Could they be decreased by habitual technology usage? All in all, virtuality of telecommunication does not eliminate the necessity of face-to-face dialogues. They are complementary to the electronically mediated ones, turning into useful means to schedule and coordinate them. In many cases, direct contacts are mandatory and cannot be replaced by the mediate ones, particularly in the sphere of official/ important business relations where visual cues and overall appearance are increasingly important. However, in other spheres of communication, a structural change has manifested. In many situations, it is not important to see your partner and to observe his/her body language, but to reassure him/her that everything is OK with you, that you will be in time on the meeting, or that you miss him/her. In my opinion, particularly informal communication with friends and family, work contacts and emergency situations benefit from mobility and ubiquity features of mobile phones. In this way, communicators are indeed mere knots in a huge network, but they may be reachable when needed.

The considerations above are only some examples of how human actors mentally dispose the other elements like handsets, space, mobility and communication, and construct the intertwined space-time structure of mobile communication. In the following empirical chapters, this structure is going to be detailed and empirically tested.

3.2. Mechanisms of Structure Re-build in the Mobile Telephony *Dispositif*

It has previously been maintained that the *dispositif* had structuring effects on human subjects and their relationship with technology. Two main processes define this formative action. The first one concerns the influence of technical frames: devices, cellular architecture on users and translates into a gradual structuration after technical patterns of human senses, perception, communication, and movement in space. The second one corresponds to domestication - the integration of technology in the daily life - defined by creative reactions of users to “technical” dispositions. Various sociological stances from the field of Science and Technology Studies help clarify these two intertwined and complementary processes.

3.2.1. The Influence of Technical Arrangements: the Technification Process and its Stages

Broadly speaking, technification implies a gradual restructuring of human functions by technology (Akos Paulinyi, 1980) or a reorganization of various areas: perception communication, text production work, etc. after technical patterns. The widespread use of electronical media has led to the formulation of various technification stances in this field. For instance, referring to television, Knut Hickethier emphasized the re-organization of space and time for a given culture as a consequence of the television and radio technologies:

"Ein Überblick über die technische Entwicklung der Rundfunktechnik (Radio und Fernsehen) in ihren zentralen Problemstellungen soll zeigen, wie sie versucht, Zeit und Raum für die Kultur neu zu organisieren. (...) Dabei ist die These, dass mit der Filmtechnik eine technische Entwicklung der Bilderzeugung, -speicherung und -vermittlung an ein Ende gekommen ist

und mit den Rundfunkmedien eine neue Entwicklung begonnen hat, die auf der Basis der Elektrizität ansetzt.“⁵⁸

In a similar way, Martin Rost focused on the technification of communication as a result of the usage of computer technology in text processing:

"Technisierung bedeutet, daß Dokumente durch quasi-autonome, also automatisch operierende Text- und Kommunikationsmaschinen bearbeitet werden. Klassische Textverarbeitungen werden bislang primär als eine bequeme Layout-Hilfe eingesetzt." (Rost, 2002, online citation)

At a higher level of generalization, technification touches the basis of the relation between human subjects and technology. In his study, *Technik aus soziologischer Perspektive* (1993), Werner Rammert conducted an in-depth analysis of the main theoretical positions in this field and criticized both anthropological and sociological approaches of the media theory to technification. On the one hand, he maintained that the main drawback of the anthropological approach is the lack of sufficient social analysis. On the other hand, Luhmann's sociological theory (1975)⁵⁹ leaves no place for technical materiality⁶⁰ Technification means:

“Schematisierung von Sinnverarbeitenden Prozessen, um sequentielles Operieren und Neukombinieren von Schemata zu komplexen Gebilden zu ermöglichen. Die Entwicklung binärer Schematismen, wie reich/arm, wahr/unwahr, und die Herausbildung symbolischer generalisierten Medien, wie Geld, Wahrheit sind die Stationen dieser Technisierung der Kommunikation.” (Luhmann quoted in Rammert, 1993, p. 304).

Trying to conciliate the two divergent poles, Rammert supported the existence of several stages in technification. Technology, as it is used in society and in everyday life represents the result of a multistadial selection. In the first stage, technification could be defined as: “*ein Schema der Wahrnehmens oder Operierens von anderen Haltungen and Handlungsweisen*” (Rammert, 1993, p.304). The daily life communication is an important provider of “*Technisierungsschemata, die in den Pool der technischen Möglichkeiten angehen*“ (Rammert, 1993, p 307). In the second stage, there appears a selection between various media, in which technification takes form (Rammert, 1993, p. 306). Particularly useful in this stage is the anthropological approach of media theory preoccupied with the relation between human senses and technology.

Related to the technicised mobile communication, attempts to enhance the human communication through apparatuses have begun long ago in history.⁶¹ Although the telegraph

⁵⁸ cf. Hicketier, Prof. Dr. Knut', *Das Wunder der Technik' - die Technisierung von Zeit und Raum im Rundfunk* <http://www.rz.uni-hamburg.de/GfM/abstracts.html> (22 April, 2002).

⁵⁹ As Leydesdorff emphasized, Luhmann's sociological theory of communication bridged the gap between symbolic interactionists and Parsonian system's theoreticians through considering the core concept of the symbolic interactionism; the interactive construction of the social meaning, as the unit of operation of social systems. In Luhmann's view, the analysis of the social structure should not be based on the aggregate of actions, but on the interactions between them (Leydesdorff, 2000, online citation).

⁶⁰ "Immerhin weist er ...daß die symbolisch generalisierten Medien die technischen Medien voraussetzen würden" (Rammert, 1993, p. 305).

⁶¹ As Kittler said, „Self-evidently there must always have been technical media, because any sending of signals using acoustic or visual means is in itself technical. However in preindustrial times channels such as smoke signals or fire telegraphy, which exploited the speed of light, or bush telegraphs and calling chains making use of the speed of sound, were only subsystems of an everyday language. The beacon signal from Troy to Mycenae

as one of the first worldwide technical communication media could not be regarded as a true technification of an acoustical medium yet, as Michael Giesecke outlined, “mit ihm werden zum ersten Mal elektrische Schwingungen systematisch für eine Nachrichtenübermittlung genutzt“. (Giesecke, 2002, p.1) The telegraph represented thus a „*Vorstufe*“ (preliminary stage) for the telephone - the real technification of acoustical media:

“Während es beim Telegraphen darum ging, taktile Bewegungen, vorzugweise das Drücken der Morsetasten mit dem Finger, in elektrische Impulse zu übersetzen, zielt das Telefon tatsächlich auf eine analoge Codierung der menschlichen Stimme, also von akustischen Wellen ab”(Giesecke, 2002, p.1).

At his turn, Rammert (1993) considered that, in the genesis of the phone technology, the first stage (beginning with the patent of the telephone in 1876) corresponded to the nature of scientists' ideal of life simulation through artificial organ construction. The main objective of these inventors was to develop ideas and devices that would simulate human hearing and speaking (Rammert, 1993, p 233-235). The first significant try belongs to Phillip Reis, who succeeded in 1860 in creating an artificial ear. Technification of writing in mobile telephony occurs with the introduction of text messaging (SMS, e-mail). The classical writing, itself a technification of human thought and reflection, uses specific devices, which have important effects on the style and appearance of the end product. In SMS, a fast typing requires dexterity and high motivation to communicate something. Many users prefer not to use this service because they find the mechanical act annoying, the screen too small, and the letter selection too complicated. Many improvements have already been made, but there is still place for improvement. The fast typing is encountered not only in SMS, but also in the Internet chatting and messaging. However, while e-mails are somehow similar to letters in terms of reaction delay, in chat and instant messaging, communication is carried out in real time. In 3G cell phones, another human sense is to be technically structured: the seeing. New forms of image communication (MMS-transmission of context photos) have recently been developed in mobile phones, and their potential to overcome some of the former drawbacks of mediated communication (particularly the lack of social visual cues) is important. They try to substitute the eye in capturing and transmitting context-dependent shots and photos – a promising feature for a less stereotypical, richer communication. The MMS works much the same way as SMS messages, but allows users to combine audio-; graphic-; text- and imaging content in one message. Once the user has selected a picture, written a text, and/or included an audio clip, a multimedia message can be sent directly to another multimedia messaging capable terminal, as well as to the recipient's email address. The graphical user interface and joystick with 5-way navigation add ease and speed to the use of this new device.

It is amazing how many senses mobile communication technology involves and changes. However, the structuration of human hearing and visual senses and organ imitation constitutes only a single aspect of the technification process. What makes mobile telephony specific is the technification of the spatial and temporal behavior. Users move within cells or from cell to cell within a larger coverage area in order to communicate with one another, and in doing this, they make use of the complex transportation and traffic *dispositif*, itself a technification of human movement in the physical space. Therefore, in wireless technology usage, the complex technification of movement in space combines with the technification of communication to create the two intertwined structures described before: mobile communication and communicative mobility.

with which Aeschylus introduces the literary genre of tragedy announced in one single bit the fall of the besieged fortress although that depended on prior arrangement.” (Kittler, 1996, online citation)

In conclusion, in the second phase of technification of communication, information, and movement due to mobile telephony usage, senses and actions are more and more “absorbed” and transformed by usage. The technology complexity makes technification be multidimensional, as well – a combined structuring of hearing/speaking habits, text production and processing, information handling together with position/proxemics in communication; general usage patterns; localization; time planning, daily rhythms; mental imagery and many other dimensions. Each of them is technicised into one of the technology components, sustaining the main programs of the *dispositif*: mobile conversation (telephony; SMS and e-mail); communicative mobility (places, movement while communicating); information and agenda (wireless Internet, PDA functions). As can be observed in Figure 8, not only are communication and movement patterns technically transformed, but since the individual, technology and society cannot be separated, the communicator and the web of social contacts are structured, too. With technology usage, the past face-to-face communicator is turning into the cell phone user characterized by specific socio-economical traits, lifestyles and values. The social sphere, the number, and quality of contacts performed by the "technicised" cell phone user are subjects of technification, too.

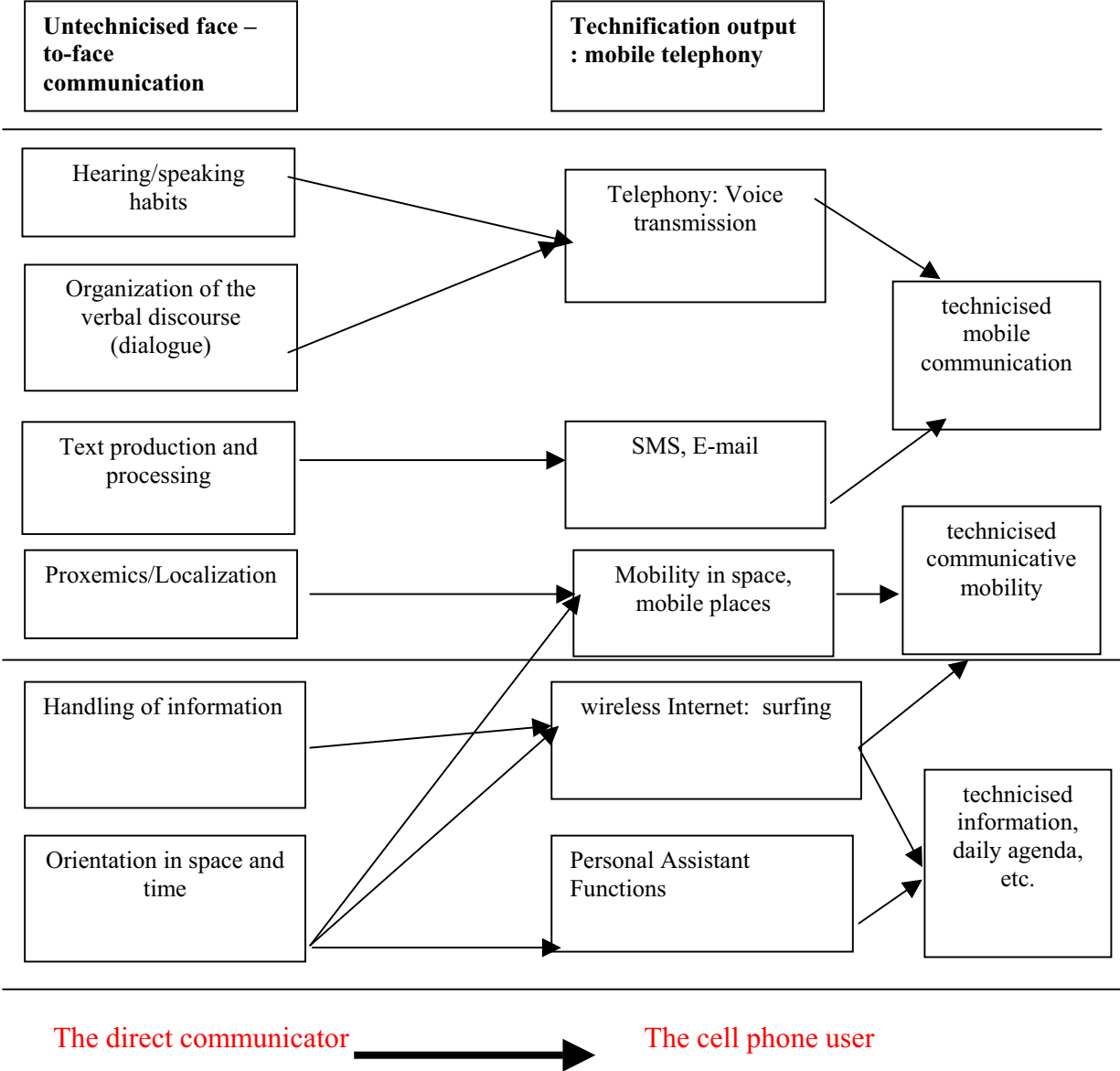


Figure 8. Technification input and output

3.2.2. Users' Reactions to Technical Dispositions: Adoption and Domestication

As singled out by Rammert (1993), the third stage of technification describes the intimate integration of the technology into daily life, a process called domestication by some authors. The constitution of both technicised mobile user and humanized/customized technology are key issues in this phase. At this point, human subjects, as users rather than as technology creators, are in charge of the technification and transform it into a social and cultural process.

Many user studies cope with users' awareness; arousal/rejection; purchasing intent; adoption and integration of wireless telephony into the daily life. They belong to one of the main theoretical orientations: *adoption, usage and gratifications* and *domestication studies*. These research directions are quite different in level of analysis and in focus on the adoption process. There are some slight but important differences among the levels. As Pedersen and Ling showed, while diffusion research studies adoption at the aggregate level, adoption research examines adoption at the individual level, and while adoption research focuses on the description and explanation of adoption, domestication research rooted in sociology is more concerned with the individual and societal consequences of adoption and integration of technology in the daily life (Pedersen, Ling, 2002, online document).

Important research on diffusion and adoption of mobile telephony can be mentioned. One of the first is Bakalis', Abeln's and Mante-Meijer's study focused on adoption. This singled out that, at the beginning of 1990, only international mobility showed a significant correlation with adoption of mobile telephony. Mobile phones were then mainly business tools (Bakalis, Abeln and Mante-Meijer's, 1997).⁶² Adoption of cellular telephony was positively associated with an undeveloped fixed network⁶³; poor fixed network development due to the geographical factors like in Norway or Finland; income and price (the connection charge for fixed telephony showed a significant correlation with the adoption level of mobile phones). The authors further explained that the introduction of GSM accompanied by intensive promotion and attractive extra-services boosted the adoption of mobile telephony. As mobile telephony moved more and more into the private sphere, lifestyle and lifecycle became, indeed, very important for explaining differences in use, as might gender as a culturally defined role and position in society. The authors also emphasized several differences in adoption among European countries. The studied countries could be divided into two groups in terms of the rapidness of the adoption: the first group, characterized by an early start and/or a fast adoption consisted of the Nordic countries; Switzerland; the United Kingdom and the United States. The remaining countries of Western Europe, the Southern European countries and some of the Eastern European countries started at a later stage or showed a rather slow adoption rate, resulting in current low adoption levels. Germany; the Netherlands; Portugal; Spain; Austria; Finland and especially the United States exhibited an almost perfect standard S-curve for the adoption of mobile telephony. Another study included Italy and Norway on this list (Enid Mante, 2002). Early adopters were in all countries young people and teenagers, a group that has raised a considerable interest among researchers of all orientations. (Bakalis, Abeln and Mante-Meijer, 1997).

⁶² A good comparative example of adoption curves in Europe is given in the article of Sandor Bakalis, Muriel Abeln and Enid Mante-Meijer: *Adoption Curves in Europe*. In 1995/1996 they conducted a research project on macro-factors which cause different adoption patterns of mobile telephony in Europe. They focused particularly on the effects of social and cultural factors on the adoption of mobile telephony.

⁶³ Bakalis, Abeln and Mante-Meijer identified a low penetration of fixed telephony, combined with a high waiting list for new fixed connections in various countries showing relatively high adoption rates (Bakalis, Abeln and Mante-Meijer, 1997).

In the collective work *Perpetual Contact, Private talk, Public Performance*, edited by James Katz and Markus Aakhus, (Cambridge, University Press, 2002), a series of national studies and surveys explored “the culturally specific reception and adoption of the mobile phone, as well as the relationship between national values and communication behaviors involving the mobile phone” (Katz, Aakhus, 2002, p.12). For instance, Jukka-Pekka Puro analyzed the meaning and demographics of mobile phone usage in Finland. He was first intrigued why “Finns, who were traditionally thought of as ‘silent’, suddenly appeared extremely voluble when their communication is piped through a mobile phone” (Katz, Aakhus, 2002, p. 16). Because Finland’s social, political, and cultural life intertwines with the activity of the technological giant Nokia, the massive penetration of the mobile phone heavily influenced Finnish culture, leading to the development of communication practices and expectations “that challenge fundamental aspects of self-identity, including the use (and possible abuses) of speech culture”(Katz, Aakhus, 2002, p. 16). Also, Arnit Schejter and Akiba Cohen were preoccupied by the unprecedented growth of the mobile phone market in Israel. Their main conclusion, after examining various data and examples, is that the characteristics of the medium and the Israeli culture are mutually reinforcing and extending. They explored three areas in this regard. The first concerned functions and uses (including uses and gratifications; status symbols and identity creation; selection and use of mobile phone features and parental control over children). The second dealt with ethics, etiquette and values (including the blurring of public and private space, pedestrian and driver behavior, advertising for mobile phones, and tone, volume and manners). The third examined policy questions (including social aspects of market policy, competition, universal service obligations, privacy, and regulation of behavior in public.” (Katz, Aakhus, 2002, p.16) Based on a group of three extensive studies (a telephone survey sample conducted in Italy, France, Germany, Spain and the UK; an Italian survey and a free association test of a sub sample), Leopoldina Fortunati analyzed the causes of adoption and the social identity of the mobile phone in Italy in comparison with the rest of Europe. Interesting is that she attacked some of the common theoretical views about the meaning and effects of mobile telephony “as a communicative, mobile, metropolitan, portable, intimate technology” (Fortunati, 2002, p. 17). She used her data set to show “where stereotypes were supported and where they were refuted” (Katz, Aakhus, 2002, p. 17). Another important idea advanced by Fortunati concerns the importance of the symbolic and social dimensions of the telephone: the technology in relation to the body. More than other functional explanations, this could have been a good reason why Italians, although very light users of the landline telephone, were among Europe's heaviest users at the date the studies were conducted. Focusing on Korea, Shin Dong Kim also revealed the high importance of socio-cultural factors in explaining the meteoric growth of the mobile phone in his country. The starting point of his analysis was the paradox that “the seemingly casual and social-barrier-penetrating qualities of mobile communication are taken up with such enthusiasm in a highly collectivist and hierarchical culture.” (Katz, Aakhus, 2002, p.17) His explanation emphasized “the subtle changes in communication practices and expectations that accommodate the mobile phone into everyday life, which, in turn, lead to more dramatic shifts in expectations about appropriate and competent communication.” (Katz, Aakhus, 2002, p.17). Another interesting exploration of adoption and diffusion is Kathleen Robbins’ and Martha Turner’s research on why the USA lags so far behind Europe and the Pacific Rim countries in terms of penetration in the usage. Next to the reasons arising from the US regulatory background, they highlighted some aspects of the American character and national policy that yielded the unique configuration found in the USA. Most important for the current thesis, Robbins and Turner gave an update to the profile of users and non-users in the USA (Katz, Aakhus, 2002, 2002, p. 17). In the same manner, Enid Mante has revealed interesting similarities between the Netherlands and the USA mobile users. She emphasized the

processes of dissolution of boundaries between countries and regions, between home and work, between work time and leisure time, and between time zones, that are due to general globalization tendencies, and widespread use of information and communication technologies (ICTs). One of the consequences is, in her opinion, that a “sense of location, and a sense of the home base, is becoming lost” (Katz, Aakhus, 2002, p.18).

Focusing on Norway, Ling examined how mobile telephony has spread in Norway and particularly among teens (Ling, 2001). Starting from the obvious saturation of this social group, it was of interest to know what this can tell regarding the mechanisms of adoption. Interesting, here, was the critical analysis of Rogers’ work in comparison to Silverstone’s and Haddon’s domestication perspective. The positive and the negative sides of these approaches were examined in relation to the mobile telephone. Enid Mante-Meijer and Richard Ling, pursued a similar objective of study in *The Adoption and Use of ICT Services in Europe Potential acceptance of Mobile Broadband Services*. Based on data of the P903 project, “ICT Uses in Everyday Life,” the authors tried to answer questions on the probability of the use of mobile broadband services in Europe. Starting with current adoption and diffusion patterns, they looked into factors influencing use and non-use of mobile phone and Internet.

Finally, Pao-Ling Chiu, Martin Güll and Charlotte Wanninger (2001)⁶⁴ intended to identify how Mobile Internet may diffuse to the mass market from a consumer’s behaviour perspective by applying existing diffusion and adoption theories. Their conclusion was that there was a gap between the early adopters and the early majority. It should not be taken for granted that an initial acceptance on the market will induce a mass market take-off. They also rejected the idea that Mobile Internet would reach the mass market in the shape of a Web browser.

Domestication studies have brought an important contribution to the comprehension of the expressive functions of mobile telephony possession and usage - corresponding to mobile communication as defined in this thesis and to user’s coordination of travel/ movement through mobile telephony, which characterizes the *communicative mobility* structure in the *dispositif*. As the word beautifully suggests, domestication represents the crossing point of techno-logic with the socio-logic. This means that the insidious technology manifests more and more its presence in the daily life and gains in meaning for human subjects, who become fully aware of its possible influences. From this moment, it cannot be said which of the two elements - technology or humans - are the cause of the other’s change, because they are too intimate, too closely related to each other. The solution to the structuration dilemma in the *dispositif* is to consider them simultaneously.

As Pedersen and Ling asserted in a synthesis about studies carried out about mobile telephony (2002)⁶⁵, the central theme of domestication represented the societal consequences of the integration of technology in daily life: consequences of mobile telephony for the planning of cities (Townsend, 2000), for the family as an institution (Fortunati, 1998), micro and hyper-coordination of the daily life (Ling and Yttri, 2002; Ling and Haddon, 2001). Pedersen and Ling also noticed that domestication studies most often applied qualitative methodology, therefore being more descriptive. In this category fell studies of Oksman and Rautiainen on

⁶⁴ In *Mobile Internet -For Technique Freaks or Mass Market*) 2001/3
<http://www.lri.lu.se/pdf/uppsatser/infocom/2001-3.pdf>

⁶⁵ In Pedersen, P. E. & Ling, R. (2002). Mobile end-user service adoption studies: A selective review. *Scandinavian Journal of Information Systems*, 14. Retrieved February 21, 2003 from World Wide Web URL: http://ikt.hia.no/perrep/pedersen_ling.pdf.

Finnish adolescents (e.g. Oksman and Rautiainen, 2003), of Weilenmann on Swedish teenagers (e.g. Weilenmann and Larsson, 2000) and of Ling and others on Norwegian teenagers (e.g. Ling, 2001, Ling and Yttri, 2002).

Several studies included in the aforementioned volume, *Perpetual Contact, Private talk, Public Performance*, edited by James Katz and Markus Aakhus, (Cambridge, University Press, 2002) worked at the micro-level and focused mainly on the dualism of acceptance and rejection of the technology in various social groups and on the process of “negotiation of the social-communicative order involved in the way people bring together the technical and the social” (Katz and Aakhus, 2002, p. 12). The driving group, the teenagers, constituted the preferred target population in this chapter. In this context, Rich Ling and Birgitte Yttri outlined in *Nobody Sits at Home and Waits for the Telephone to Ring. Micro and Hyper-coordination through the Use of the Mobile Telephone*, the concepts of micro-coordination of daily mobility as an instrumental activity and the hyper-coordination as an expressive function of mobile telephony. Their analysis showed that micro-coordination was common for two-career parents. When examining teens, however, they found that, in addition to the instrumental use, an expressive use of the device has been adopted. This usage of technology was related to their desire of access to peers and separation from their parents. Eija-Liisa Kasesniemi and Pirjo Rautiainen focused on how teens used the SMS service and described how text messaging has become part of teenage culture in Finland. For that purpose, they interviewed Finnish teen (aged 13-18) owners of mobile phones, as well as their parents and teachers. An interesting conclusion was that the mobile phone, which was often presented as an individual's communication tool, was used by teens to perform distributed, collaborative relational work: “The Finnish teens use this tool in a manner that would inspire awe in the computer-supported cooperative work community. The teens have also developed practices to make a clumsy interface work, an interface, we might note, that would probably not be a successful technology had it been introduced solely as a text service. Like the Norwegian teens, the Finns have shown tremendous dedication and ingenuity in achieving communication bliss with their peers and, in so doing, have elaborated the ways and means of perpetual contact.” (Katz and Aakhus, 2002, p. 138) One surprising conclusion belonged to Chantal de Gournay, who explored micro-behavior on the cellular mobile phone in France. She based her analysis on the results of six focus groups carried out for EURESCOM P 903 in Paris and Montpellier between September and November 1999. Diverging from the conventional criticism idea that media would reduce face-to-face contact and thus create social distance, she argued that mobile telephony: “did not bring a loss of intimacy but the ascendancy of the private sphere over the public sphere and subsequent loss of formal conversation, which is an important form of expression and sociability.” (Katz and Aakhus, 2002, p. 138) Also, Dawn Nafus and Karina highlighted the reinforcement of individuality as an effect of mobile telephony usage, claiming that: “the ‘novel’ mobile phone reaffirms old cultural notions about individuality and is thus implicated in the production of individuality and personhood.” (Katz and Aakhus, 2002, p. 138)

Other studies in this volume examined the role of the mobile telephone in public performance, with special attention given to the unique characteristics of the mobile phone relative to other personal technologies and the prospects of what the editors have called: *perpetual contact* (Katz, Aakhus, 2002). This section also examined the implication of the “non-usage” of mobile phones, thus revealing how the mobile phone influenced aspects of social life that might otherwise go unnoticed.

Closely related to the comprehension of *communicative mobility*, another direction of domestication research is represented by the study of mobility in ICT's usage. Mobility manifests as the tendency of the new information and communication technologies artifacts to become increasingly portable and to be increasingly individualized in their consumption (Kehr & Zeidler, 2000 quoted in Boudourides, 2002). It should be recognized that the relationship between wireless technology usage following various purposes (communication, coordination, information, supervising, agenda, etc.) and the actual movement in space is a complex issue. For instance, it is difficult to ascertain if a change in physical mobility really manifests with the rise of new telecommunication technologies, because the young wireless technology needs some time to exert its influence.

The first tendency would be to expect that mobile telephony usage had a strong impact, either positive or negative, on travel and movement in the physical space. Some recent studies confirmed this hypothesis. For instance, a study conducted by Richard Ling and Leslie Haddon looked into the use of mobile telephony and the coordination of everyday mobility (Ling and Haddon, 2001). The paper was based on an analysis of travel/telephone diaries filled out by 93 persons and showed that traditional fixed telephony generated more trips than it saved. By contrast, mobile telephony might actually save travel. Also, Kim discovered that mobile phone enhanced frequency of social gathering after work (Kim, 2002). In addition, higher communicative connectivity *among various moving actors* can be also achieved through mobile telephony usage. As a consequence, as Ling and Yttri emphasized, cell phone users can be expected to promote revolutionary changes in traffic systems, because they allow for more coordinative communication between moving vehicles.⁶⁶ How can they do this? First, moving drivers can be called to redirect their vehicles to other places, thus adapting to quickly changing circumstances and needs. Consequently, taxi drivers in cities seem to reach their destination more efficiently. Secondly, the "softening of time schedules" becomes more tolerable, as a driver who is too late for a meeting can easily reassure the other participants that he is at least on the way and may arrive only 10 minutes late. And thirdly, there is more capacity to substitute rigid time scheduling altogether by processes of "gradual approaches," so that time and place of gatherings are fixed only just before they occur."⁶⁷ (Ling/Yttri 1999).

However, in the debate about the effects of mobile telephony usage on a user's mobility in space, Fortunati (2002) and de Gournay (2002) came with more nuanced positions. In particular, Fortunati has doubted that wireless technology was indeed mobile and metropolitan in its usage. She has found no correlation between moving home, a key macro-measure of mobility, and the use of the mobile phone. Also, Chantal de Gournay has considered mobility as a secondary attribute of the mobile phone. She has declared that she has been forced to renounce the thesis of "the emergence of nomadic trends in society" (de

⁶⁶ "It was not until the rise of mobile telephony that transportation and communication were again linked together. Previous to this one who was in transit was also incommunicado. Now mobile telephony allows for nearly continuous and ubiquitous communication under transport. This barrier has fallen and those who are in motion or away from a known "fixed" terminal, are also available telephonically." (Ling/Yttri, 1999 quoted in Haddon et al. (2001) *From Mobile to Mobility: The Consumption of ICTs and Mobility in Everyday Life*, Report for COST269.

⁶⁷ "A third variation is the progressively exact arrangement of a meeting. Two parties might, for example, generally agree to meet somewhere at an approximate time. As the two are in transit they might call each other to confirm the timing and the location. Finally, if the two can not locate each other at the agreed upon place at the agreed upon time we can have a third round of calls for the final location of each other. Thus mobile communication allows for the structuring and rationalization of interaction, particularly in the face of distributed participants." (Ling/Yttri, 1999, online citation)

Gournay, 2002), arguing that current statistics on users' actual mobility showed that the daily distance traveled has barely increased, but the trips tended to occur more evenly throughout the day. (de Gournay, 2002, p.194)⁶⁸

As suggested by the members of the COST 269 Mobility Workgroup⁶⁹, the perspective could be also reversed, saying that changes in mobility could affect wireless technology consumption (Haddon et al, 2001). For example, Raymond Williams argued that the spread of certain ICTs in the UK at the start of the 20th Century (e.g. photography, gramophones, cinema), as well as the growth in popularity of media, such as newspapers, reflected the greater geographical mobility that was occurring at that time as people moved to live and work in different locations (Williams, 1974, quoted in Report for COST269). This has led people to be more interested in information and communication technologies that preserved memories and helped those who had moved to keep in touch with what was happening in the places where they had come from. In this case, it might be speculated that the growing mobility in everyday life has helped to create the positive reception given to mobile phones, through giving rise to more occasions when such ICTs have been perceived as being very useful (see the Report COST 269, also in Townsend, 2001).

Next to mobility issues, several domestication authors were particularly interested in the effects of communication technologies (and of mobile telephony in particular) on urban structure and development. Examples include: *Life in the Real-Mobile Telephones and Urban Metabolism*, (Anthony M. Townsend, 2000) and *How Telecommunications are Transforming Urban Spaces* (Mitchell L. Moss and Anthony M. Townsend). For instance, Anthony M. Townsend, in “*Mobile Computing and Communication: New Interactions between Information Architecture and Infrastructure Use*” (2001), argued that the rapid growth of mobile communications and computing in the first decade of the 21st century would challenge the urban planners and managers. This could lead to changes in the location of human activities in urban areas, in the character of these activities, and most importantly in the way such activities are organized and coordinated. The author also suggested some possible topics of a new research agenda in this area.

In the following sections, the micro-level perspective of domestication will be employed to conduct an empirical study, which aims to validate and refine the *dispositif* model presented in the chapters before. The circular relation technology – human users concretized in specific communicational and movement behaviors will be examined with the help of a set of variables, defining wireless telephony usage, perceptions and attitudes of users and non-users.

⁶⁸ “There is little difference now between peak hours and the rest of the day - people move about all the time, including the evening, for leisure and especially for shopping. The success of the mobile phone cannot be explained by structural factors of economic or social change because the organization of labour, family structure, the transportation infrastructure and urban life have undergone no objective changes that coincide with the introduction of mobile phones. Paradoxically, for the first time in France, the trend towards national centralization and urban concentration (constant since the industrial revolution) has reversed. The probable consequence will be shorter daily trips because jobs, leisure activities and cultural sites are closer to home, even if French men and women are using air transport more for holidays, tourism and professional trips. We therefore need to look for explanations elsewhere.” (de Guernay, 2002, p. 194).

⁶⁹ In Haddon, de Gournay, Lohan, Östlund, Palombini, I, Sapio, Kilegran, (2001) *From Mobile to Mobility: The Consumption of ICTs and Mobility in Everyday Life*.

4. AN EMPIRICAL APPROACH TO THE WIRELESS COMMUNICATION *DISPOSITIF*

In this part of the thesis, the previous models and explanations will be applied to the actual technology development and usage. First, the recent constitution of the *dispositif* in Germany will be portrayed. Also, international developments will be highlighted. Next, the empirical study conducted to validate the model will be described and its results will be analyzed in depth.

4.1. Background: A Portrait of the Current Mobile Telephony Usage - Data and Facts

4.1.1. Mobile Telephony Market and its Perceived Importance

Mobile telephony proves to be globally one of the most successful and widespread communication technologies. As a BITKOM study (quoting EITO findings) revealed, in 2002 the number of mobile links exceeded 1 billion; among them, 70 % used the GSM standard. Also, the number in Internet users was increasing with 100 million every year. In 2003, more than 700 mill Internet users were expected. The fastest diffusion rate was encountered in DSL channels, with a 71% yearly increase. Also, 23 million households used the cable modem for fast Internet access. And last, but not least, through UMTS, new data applications in mobile telephony became of interest⁷⁰. More recent data from the same source, (*BITKOM report 2005, Daten zur Informationsgesellschaft. Status Quo und Perspektiven Deutschlands im Internationalen Vergleich*), indicate that more than 1.6 billion people use mobile phones internationally.

Also, in Germany, mobile phone ownership and usage has been dramatically increasing. More and more people were recognizing the importance of the technology for social and economical spheres of daily life. As presented in *Jahresbericht der Regulierungsbehörde für Telekommunikation und Post*, at the end of 2002, 59.1 million persons used the services of mobile phone operators D1, D2, E1, and E2. A penetration rate of 71.7 percent and a yearly increase of 2.9 million users were reached. Internationally, the current penetration rate in Germany was higher than in the USA (47.7 Percent), Japan (62,1 Percent) and Eastern Europe (30 Percent), but it was with 5% under the west-European average penetration (77%). Another 31% of potential users, expecting to buy a mobile phone in the next two years, were foreseen. This growth is quite impressive, given that in 1992 the penetration rate was of 1.2% and in 1999 of 28.5%. In 2004, 71.3 millions users and a penetration rate of 86.4 % were recorded (*Jahresbericht der Regulierungsbehörde für Telekommunikation und Post, 2004*). More recent research⁷¹ forecasts a further increase of the penetration rate of mobile telephony to 91 % in 2005 and to 95 % in 2006 (BITKOM report, 2005).

⁷⁰ *Wege in die Informationsgesellschaft. Status quo und Perspektiven Deutschlands im Internationalen Vergleich*, BITKOM, 2003.

⁷¹ *Bitkom report 2005: Daten zur Informationsgesellschaft. Status Quo und Perspektiven Deutschlands im internationalen Vergleich*.

In 2002, 52% of mobile users employed pre-paid cards, a fact somehow disadvantageous for providers because they don't generate turnover. This percent remained almost constant until 2004 (50.5%). In Germany, the most important network providers have been: T-Mobile (T-Mobile Deutschland); Vodafone D2; E-Plus Mobilfunk; O2 (VIAG Interkom) and Group 3G (Quam). However, the number of service providers is greater: Cellway Kommunikationsdienste; D-Plus Telecommunications; Debitel; Drillisch; E-Plus Service; Hutchison Telecom; Mobilcom; NetzTel Plus; RSL Com; Talkline; Tangens; TelePassport; and VictorVox.

The successful domestication of mobile telephony has been proven by the way that users acknowledged its importance and social and economical consequences. In 2001, Forsa Society for Social Research and Statistic Analyses ltd. Berlin examined, on behalf of IZMF, the mobile usage behavior of Germans, focusing on the meaning and importance they attached to the mobile phone in various spheres of daily life. Indeed, 1005 citizens older than 14 years were questioned with the help of computer-assisted telephone interviews. Respondents were selected through a systematic probabilistic sampling procedure, which guaranteed that each person had the same chance to fall into the sample. Thus, the sample selection ensured a representative cross section of the German population. This study has confirmed the integration of the wireless communication technology in the every-day life of Germans. A significant difference in the amount of mobile usage was identified between West and East Germans, with West Germans using the mobile service more heavily than the former East Germans. In addition, the study found out that the frequency of mobile phone usage decreased with age: 84 per cent of users fell under 30 years of age. Other differences appeared between the individual income brackets: the rich performed more mobile calls than the poor. Also, employed persons, particularly independent professionals tended to use the mobile service more than the other occupational categories. Nevertheless, there were no relevant differences between urban and rural users. When asked about the importance of the mobile phone for the professional and the private sphere, one third of users agreed that the mobile phone was important and *very* important for work/profession. A fifth of respondents thought that mobile phones were less important in the professional sphere, and more than two fifths of them attributed to the mobile phone even no importance for profession. East Germans estimated the importance of the mobile phone for the work life to be even higher than West Germans did, as 83 % of the employed users recognized that the mobile was important for their professional life, while 15% of clerks considered the mobile phone to be important in their profession. However, in general, the mobile phone was considered more important for the private life than for the professional use (For half of all Germans, the cell phone was important or even very important in the private life, and only one tenth of German users believed that this did not have any meaning in the private life). For the East German users, the private usage of the *Handy* emerged as even more important than for the West Germans. The private use of the mobile phones was highly valued by workers and less favorably rated by independent professionals. The cell phone had even a greater private importance for retired people as well as for pupils and students than for the employed persons.

Also, in the FORSA study, non-users were asked to assess the importance of the mobile phone in their lives. It came out that two thirds of non-users stated that the cell phone was important and/or very important for them. Only a little more than one tenth of the non-users attributed no importance to the cell phone.

The study also revealed the perception of a high significance of the technology for the German economy. In the estimation of the economic importance of the mobiles, there were hardly any differences between the different occupation and age groups.

Three quarters of the respondents considered the mobile phone to be very useful in emergency situations. In particular, 21 percent welcomed the possibility of getting assistance in distress with the help of a cell phone, with only 3 percent attributing to the mobile phone a small importance in these situations. Additionally, each second German considered the mobile phone very important for medical remote diagnostics. Only a tenth of the interviewed population assessed the possibility of remote diagnostics over the mobile phone as less important. Employees, clerks and professionals, pensioners and pupils, young and old citizens equally considered the employment of the mobile phone in medicine for remote diagnostics important.

Overall, the majority of Germans felt that they received sufficient information from mobile phone operators, with less than a third of them expressing a need to learn more about the mobile phone. Those who complained about information deficits would like to have known more about tariffs and contract conditions. In East Germany, the information need about tariffs was found to be even greater than in the west of the country. This issue was followed by the information about health risks: one fifth of those who felt insufficiently informed would like to have learned more about health risks.

4.1.2. Basic Usage Programs of the Current *Dispositif*

Several quantitative studies conducted over the last five years have given detailed information about the recent evolution of the program frames in the *dispositif*. The statistical data and surveys have witnessed the continuous growth in diffusion and acceptance of this technology since 2001 (the date when the empirical study of the thesis was initiated). Thus, *Marktbeobachtungsdaten der Regulierungsbehörde für Telekommunikation und Post* (2002) maintains that the volume of mobile spoken communication had increased from 27,3 billion minutes to 32 billion minutes since 2001. Also, SMS usage had expanded with more 47,5 Percent, in comparison to the same year of reference. Overall, in 2002, 23,6 billion SMS were sent from the mobile phones. Technologies like GPRS and HSCSD allowed the successful introduction of new data and Internet services. According to BITKOM source, while in the 90's, fixed telephony and the Internet grew and developed at the same pace, currently mobile communication strongly intertwined with the Internet, so that 2003 could have represented the starting point of the mobile digital Internet world. Indeed, the last BITKOM research (2005) recognizes that, with the coming of UTMS, information and entertainment frames in *dispositif* promise to gain in importance.

Various quantitative studies conducted in 2001 and 2002 furnished a more detailed portrait of changes and evolutions in the internal structure of mobile telephony usage.

For instance, the Institute für Demoskopie Allensbach⁷² collected data about mobile telephony usage in the context of (ACTA) (Computer and Telecommunications Analysis conducted annually, since 1997). Approximately 10,000 Federal citizens between 14 and 64 years were interviewed between January and July, 2001. The 2001 survey results emphasized an increase of written communication, information and orientation functions in mobile telephony usage. In particular, 77 percent of the mobile phone users declared that they used their mobiles

⁷² Allensbach-Umfrage: *Handys sind längst nicht nur zum Telefonieren da*, Institut für Demoskopie Allensbach / dpa 22.10.2001.

telephone to send short messages, 43 percent employed the medium as clock and waking alarm, and 37 percent as directory and number listing. Young people particularly enjoyed the value-added functions. Thus, 96 percent of the 14 to 17-aged users sent SMS. For 61 percent of them, the mobile phone was at the same time clock and alarm. Also, ring tones and call melodies exercised a special fascination: 71 percent of the young people and 44 percent of all respondents were prone to equip their mobile device with them. Another representative survey of the same institute, conducted in 2002 on a national representative sample of 10500 Germans, between 14 and 69, found that the most valued attributes and applications of the technology were: long battery life, value for money device, convenient price and small weight. Only young users considered “games” important. The majority of the mobile users (79%) sent also SMS, additional to voice telephony. Nearly one third of respondents used the mobile in addition as a pocket calculator. A decrease in the attractiveness of call forwarding or mailbox was identified compared to the years before. Ring tones raised the great interest of only 32% of mobile users - a clear drop from four years ago, when 45% of users appeared to be enthusiastic of these gadgets.

In a distinct approach, a quantitative study – joint project of IZT (Institute für Zukunftsstudien und Technologiebewertung), SFZ and IAT carried out in 2001 focused on the way that private and professional users and providers were interested in various applications of mobile communication technology. An online survey was conducted on 586 small and medium-size Internet companies specialized in the Internet, mobile or e-commerce business. In the structured questionnaire, there were two categories of questions: some related to their professional assessment of mobile telephony, and others related to the private experience of the respondents with this technology. Although the results were not representative, they were nonetheless interesting for understanding how experienced experts assessed the benefits and drawbacks of particular wireless applications from a combined private and professional perspective.

The survey also indicated that users accepted the mobile phone as some kind of a constant companion in both private and work spheres. They used it not only for verbal communication, but also for SMS (over 80% in the private sphere, 65% in profession), Organizer (over 60% private, over 65% in profession), indicating that, in the work sphere, PDA functions were becoming increasingly important. However, video-telephony, scanner functions and biometric data were considered of interest only by one third of respondents. Over 70 % of private and 40 % of professional assessments acknowledged the importance of finance applications, like mobile paying. However, brokerage and mobile advice were considered less important. There was a big gap between private and professional responses in terms of mobile shopping; in the private sphere, users were more interested in ticketing and auctions, which were only of small interest for the work area. This fact confirmed the relevance of business-to-consumer M-commerce strategy. More than ¼ of private users enjoyed the entertainment functions, like music chat rooms and games, and considered them to be of interest. As expected, in the professional sphere, users were not very enthusiastic about them.

The most valued healthcare mobile application was the automatic emergency call, considered very important by over 60 % of private responses. Location-based services, like navigation systems and local information, were considered useful in the private sphere by over 60 % of users and in the work sphere by more than 40 % of users.

The main factors which delayed the development of the mobile Internet were, in the respondents opinion: the too exaggerated prices; the poor content; the low service quality; the poor data security; and the opinion of other disappointed customers.

Referring to the price strategies, the majority of users were in favor of the fixed payment tariffs. Interestingly, the usual price timing method, the clock pulse tariffs, had a poor acceptance quote of below 30% in the private sphere and 12 % in profession. Private users were twice as likely to prefer the pre-paid tariff variant, rather than to prefer the *Zeittakt* tariff. Usually, private users spent, on average, up to 50 DM per month. Although the study identified a group of private heavy callers who spent up to 150 DM per month, in general, users were not so prone to pay more than 25 DM/month for content services. Conversely, one third of professional users declared they paid on average up to 100 DM per month for content services, and another third of them more than 450 DM. There was also a relevant difference between voice and data services in this respect.

The phone as mobile office emerged as an important future usage of wireless technology. As a consumer survey of *space2go GmbH (www.space2go.de)*⁷³ indicated, more and more Germans used their *Handy* not only for telephoning, but also to access their personal e-mails (67% of respondents). The study outlined that 62% of respondents used the mobile phone as a directory and appointment calendar. Over 50% of respondents expected from new mobile phones to include an on-line Organizer, through which addresses and dates can be coordinated with the PC at home or in the office. Despite the promising consumer expectations, the study also revealed the immaturity of mobile office applications in wireless technology usage, since 28% of users declared that the mobile phone did not satisfy all their professional needs while traveling. In this situation, they usually carried with them an additional pocket calculator with a big display and more functions.

Interestingly, a XONIO study from 2001 expected that UMTS and GSM would coexist for a long time.⁷⁴ In more detail, this forecasted that in 2010, 50 % of all mobile users would use UMTS services, continuing in the same time to employ the GSM, because GSM and GPRS would offer for a long time valuable core applications, while UMTS would provide more Premium priced business applications. In its overly optimistic assessment of the success of UMTS mobiles, the study is based on the analogy with the ancestor of GSM (C-Netz), which was deactivated eight years after GSM introduction.

4.1.3. Trends: the Future of Guardian Services and the Mobile Internet

In 2002, *TELCO trend of the Mummert + partner management consultation*⁷⁵ conducted a regular questioning of 153 technical and high-level staff from the telecommunications industry. The research focused on developing areas and trends in wireless technology. According to the experts, Guardian services (that imply that the mobile phone would be able to know the exact location and seek out for various persons within the network area) emerged as very promising. Telecommunications experts placed this service group on the second

⁷³ Verbraucherumfrage: *Das Handy wird zum mobilen Büro* space2go GmbH / ots 19.11.2001 bundesweite Verbraucherbefragung des Berliner Mobilkommunikationsspezialisten.

⁷⁴ *SMS – ein überraschender Erfolg?. Die Entwicklung des Mobilfunkmarktes. Bedeutung des Messaging*, XONIO Mobilfunk-Raport, Euroforum Konferenz, 7 September 2001, Köln.

⁷⁵ Umfrage unter Führungskräften: *Welches sind die wichtigsten Handyanwendungen?* Mummert + Partner Unternehmensberatung / ots TELCO Trend der Mummert + Partner Unternehmensberatung - eine regelmäßige Befragung von 153 Fach- und Führungskräften der Telekommunikationsbranche. 06.03.2002.

position of all top ten *Handy* functions (with spoken communication kept on top), an increase from September 2001, when the Guardian Service ranked the seventh:

Die Top Ten der Handyanwendungen (Skala: 1 = sehr wichtig, 6 = völlig unbedeutend)

1. *Kommunikation (1,4)*
2. *Guardian-Dienste (2,4)*
3. *Information (2,5)*
4. *Unterhaltung (2,6)*
5. *Navigation (2,7)*
6. *Banking/Brokerage (2,8)*
7. *Stadtführer (3,0)*
8. *M-Payment (3,1)*
9. *Customer Care (3,2)*
10. *Telemetrie (3,2)*

One example of an already-in-use Guardian application is the "*Child Watch*," wherein parents can discover the location of their child or, at least, of his/her mobile. Another service is the "*Friend Finder*," that betrays the location of friends in the proximity of mobile communicators.

Even with the expected launching of UMTS, the telecommunications experts did not believe that the mobile telephone usage would leave the computer usage behind itself soon. Almost half of the specialists (about 48%) could not imagine that, in the year 2005, more consumers would spend their time with mobile telephones than with the domestic PC. About 21 percent of experts could not tell whether or not the mobile telephone or the computer would have the leading position in the future. On the contrary, a much more optimistic view shared the experts gathered in a conference of *Bundesverbandes Deutscher Unternehmensberater BDU e.V. zum Thema "Auswirkungen des Mobile-Business auf das Marketing der Zukunft" in Bonn*⁷⁶. It was even expected that the mobile Internet would have a higher spreading in foreseeable time than the classic Internet over the conventional PC. For this, mobile providers should trade off convincing new services with the characteristics of the terminals and comfortable paying possibility. Even though the connection over GPRS is now already possible and ensures a fast data communication, "it is however, wrong to believe that the mobile Internet represents just a copy or translation of the classical Internet on the mobile telephone", said Strehlau. Given that completely different applications are possible and necessary, the use of the term Internet is unfortunately selected, since it leads to misapprehensions. Because the mobile society is particularly suitable for a personalized "one-to-one marketing", the customer connection can be clearly improved, and the contact quality be improved. Also, the focus on local relevant information, for example, for leisure offers in Munich or Berlin, has a high potential, said the study. The experts also claimed that the mobile systems could facilitate payment transactions, too. As Ute King Stemmler of Visa Germany stressed, telecommunications companies could think of comfortable methods of payment over the mobiles in co-operation with credit card companies.

Optimistic expectations about the future of mobile commerce are on the way of being fulfilled. BITKOM 2004 confirms that in 2003 the volume of mobile transactions in Germany

⁷⁶ Unternehmensberater: Das mobile Internet wird den stationären PC in Kürze verdrängen Bundesverband Deutscher Unternehmensberater (BDU) / ots 06.03.2002.

ranked the highest in Europe with 280 million Euro, and it is expected to rise to 5 billion Euro in 2007.

In the international context, one of the most extensive studies carried out on the impact of the mobile Internet is the Mobinet Research Project, initiated by the global management consultant *AT Kearney* and *Cambridge Business School – the Judge Institute*, to study the trends in mobile Internet usage around the world. In January 2002, 5600 users in 14 countries in Asia, Europe, and America took part in the fourth Mobinet survey. Main findings of this pool were the continuous growth of both SMS and IEPs Internet, although usage of WAP remained low. On the one hand, penetration of Internet enabled phones has increased by 41%, primarily through a large increase of 70% in Europe. User categories responsible for this growth are, according to the cited source, the under 18-years-olds (152%) and 55 to 64-year-old (64%) users. The usage of e-mail over mobile phones declined. On the other hand, the study identified strong barriers to adoption of the wireless Internet. The main reasons given by non-users were the apathy and perception of lack of value for money. The users complained about the slow access speed and the difficulty to use the service. It came out also that company phone users were less prone to use their phone for non-voice applications, especially for business use. Referring to SMS, the study found out that Europe had more light users (less than once a week) at this time, whereas the proportion of heavy users was similar to Asia. The importance of young users as drivers of the growing acceptance of premium-priced MMS services was also highlighted. The members of this category were also the heaviest SMS consumers: over half of those under 25 sent SMS more than once a day. Another finding indicated that the adoption of MMS (Multimedia Messaging Service) transactions was led by Europe with nearly a fifth having accessed ring tones and logos. There were signs that some countries had reached levels of SMS saturation, but significant growth opportunities in Asia and the USA still existed at this time. A very interesting result concerned the fact that mobile Internet users appeared to be a complement for experienced PC-based users. WAP users and IEP users were more likely to have wider access to the Internet. The study also emphasized the stronger interest of company users in sharing information between PC and phone. Finally, despite the low usage of mobiles for m-cash, respondents expressed a surprisingly high awareness and intent to use this service.

In June 2002, a fifth *Mobinet* survey interviewed 6,000 mobile users in 15 countries in Asia, Europe and The Americas about their usage of mobile phones and data transactions. Survey findings are of great interest because they catch the introduction and first impact of new 3G services. A good general awareness, but a poor benefit awareness of these services resulted. Users expected 3G phones to exhibit more speed of the actual applications rather than more functions integrated in the set. The study also revealed the untapped potential of the M-advertising, considered intrusive and frequent enough, but poor regulated and exploited. Results also confirmed that SMS became a mass-market capability in Europe, Japan and Asia, having penetration levels from 55-75 percent (in June 2002). Also, penetration of IEPs (internet enabled phones) had increased across all areas and age segments. However, the mobile Internet access continued to decrease by 20%. According to this source, a reason for this failure could be the bad user experience with the slow access speeds for existing information and data services and the same slow rollout of more advanced capabilities. Moreover, many users and non-users of IEPs were simply not interested in accessing the Internet on their phones. Since the consumer was not capitalizing on the Internet functions embedded in the handset yet, the study recommendation was to enhance training, education and support to stimulate consumer interest. PC Internet experience played a great role in the likelihood and disposition to use mobile Internet.

The *Mobinet 6* conducted in April 2003 singled out some shifts in comparison with the last wave. First of all, it revealed a significant increase in the proportion of mobile phone users who accessed the Internet at least once a month (more than one third of users or a 25% increase). Generally, the penetration of Internet enabled phones raised by 5% globally, particularly in North America and Japan. It was also impressive that, worldwide, approximately 48% of users had upgraded their phones in the past year, and another 31% declared that they expected to upgrade them in the next year. In spite of the propensity towards novelty, the study revealed that the majority of users (60%) still required first the improvement of the basic functions - i.e., longer battery life and better sound quality - before adding new features. This demand constituted itself a barrier to the acceptance of the next generation mobile technology. While past studies emphasized concerns such as, security, privacy, cost and access speeds, in the last Mobinet study, users worried about security, privacy and complexity of the technology in the case of the Americans and cost and technology in the case of the Europeans. On the contrary, the Japanese were more concerned about the keypad, content and speed of access, as being the most experienced with the mobile Internet usage. Another important question of the study was whether and how users communicated over the mobile Internet. It came out that photo messaging was becoming increasingly popular as the first breakout capability of next generation MMS. According to the quoted source, more than 80% of mobile users were aware of the photo messaging capabilities of today's mobile phones, and 64% said they were willing to pay for these services. However, actual use of MMS remained still in its infancy, because only 5% of users worldwide reported that they had sent a photo message.

The quoted Mobinet study also identified other important shifts in the internal structure of mobile communication applications. MMS users tended to send fewer SMS messages. Interestingly, saturation in Europe for SMS for younger users was confirmed by this latest study. Therefore, marketers were expected to turn their attention to the significant growth potential in the 35 % age categories. Overall, the demand for entertainment applications in mobile telephony was continuously increasing, with these services being considered “killer applications” in Japan, in other parts of Asia and Brazil. There, 32 to 65 percent of mobile Internet users accessed them, a fact that indicated the deep and successful integration of the technology in their daily lives. According to the quoted source, the niche of mobile information access through the wireless Internet was still immature at the time the study was conducted. The access of static information (news, weather, and transport) still reigned at the expense of M-banking or location- based services. Even when doing M-commerce, the main trend was to prefer traditional computers for detailed research in the phase before purchase decision, because the content, time and price of the mobile Internet were still too restrictive. However, the continuous increase of M-advertising could lead to further gains if user segmentation and Location-based Services become more sophisticated. For example, as the study maintained, consumers could use their mobiles to find businesses or merchants in their immediate vicinity, and businesses would be able to “sense” a potential consumer in their area or send out an instant discount offer.

The 2004 Mobinet wave gives the optimistic assessment that 41 percent of global wireless phone users are expected to regularly employ data services by 2005, “a four-fold increase in the past year“, which also indicates that “these new services have reached a ‘tipping point’ in terms of mass-market levels of customer interest and acceptance”.⁷⁷

⁷⁷ Mobinet Index 2004, available at: <http://www.atkearney.com/main.taf?p=5.4.1.100>.

From the surveys above, it can be concluded that the current wireless communication technology succeeds in constituting a multifaceted *dispositif*, which is still mainly oriented towards the fulfillment of the communication programs, but nevertheless, has a great potential for the realization of future information, orientation, mobile office capability, and supervising. In the following sections, particularly the re-building of the mobile communication and communicative mobility structures within the mobile communication sub-*dispositif* will be empirically examined, with the emphasis on the constitution of contents, contexts and partners; respectively movement, localization, and perception of space and time during and following the usage.

4.2. Description of the Quantitative Study: Sample, Data collection, Data Analysis

4.2.1. Objectives of the Empirical Study

A quantitative study has been conducted on the basis of the *dispositif* model presented in the second chapter of the thesis. Its main objective is to analyze the intertwined communication and mobility/localization structures characteristic of mobile telephony usage.

Research focal points include:

- Analysis of **mobile communication** in wireless telephony usage
 - rebuilding of the mobile communication content
 - interaction with other communication media
 - affective dimensions - how communication is "felt"/experienced
- Analysis of the **communicative mobility**
 - Mobility
 - Localization
 - Spatial and temporal perceptions
- Social interaction within the *dispositif*
- The constituted user and technology: images, perceptions and attitudes

4.2.2. Survey Design and Sample Matching

Due to cost, time and representativeness constraints the data were collected through an online survey. The influence of the WWW survey on the design study and interpretation of the results was taken into account in the evaluation of the study. Because the respondents were Internet users, they tended to be more technology-friendly and, therefore, the specific effects of the mobile technology might appear more attenuated than in a study conducted in a classical way. Nevertheless, an online study provides advantages which can overcome this drawback⁷⁸.

The characterization of *mobile communication* and cell phone *communicative mobility* mainly resulted from the comparison of responses of users and non-users to several key variables. In order to isolate the desired differences, a specific control strategy was employed: persons with specific usage patterns were identified and compared with persons who haven't developed these patterns as controls or referents. Allowance was made for potential confounding factors

⁷⁸ A more detailed methodological discussion is presented in sub-chapter *Limitations of the empirical study*.

by measuring them and making appropriate adjustments in the analysis. This statistical adjustment may be realized by matching cases and controls for exposure to confounders in groups by choosing a control group with an overall socio-demographic distribution similar to that of the cases. The criterion for selecting cases and referents was the combination of three variables: mobile phone ownership, frequency of mobile communication and the duration of usage and ownership. Two groups were constructed according to these characteristics. One group included heavy users who owned a mobile phone and also employed it frequently enough and for a reasonable long time. The other group included non-users and a few (5) respondents who had a mobile phone in their household, but seldom used it—less than once a month. (These very light users handled the mobile phone and had therefore the necessary cognitions, but their very poor experience with the medium made them similar to non-users in terms of expected structural effects on communication. Moreover, their response pattern was very similar to this of non-users.) While performing survey matching, I made sure to discard (from the sample) persons with extreme opinions-- for example, declared technology-enemies (in open-ended questions), who could bias the results and induce misinterpretation.

After matching, from 181 collected and 162 introduced questionnaires, a number of 151 cases were retained for analysis. The following table displays the characteristics of the two samples with the corresponding statistical difference tests between sample distributions. For a successful matching, it was important that no statistically relevant difference between the distribution of the two samples was recorded in terms of some socio-demographical variables, such as: gender, age, education, and family size.

Table 1. General sample demographics

		Usage characteristics					
		heavy user (76)			not/light user (75)		
		Count	Column %	Mean	Count	Column %	Mean
gender	Male	49	64%		50	67%	
	Female	27	36%		25	33%	
		Usage characteristics					
		heavy user (76)			not/light user (75)		
Age	(Mean)			32			35
Education	Low (Noch Schüler Hauptschulabschluß)	12	16%		6	8%	
	Medium (until Abitur or equivalent)	35	46%		30	41%	
	High (university)	29	38%		37	51%	
Work status	Employed	51	68%		42	58%	
	Student/pupil	21	28%		20	27%	
	Not employed yet	3	4%		11	15%	

Table 2. Pearson Chi-Square Tests and Mann-Whitney for several demographics

		Usage variable
gender	Chi-square	.080
	Sig.	.777
Education	Chi-square	3.295
	Sig.	.193
Work status	Chi-square	5.441
	Sig.	0.066
Age	Sig. of Z (Mann-Whitney)	0.083
Family dimension (Nr. of persons/household)	Sig. of Z (Mann-Whitney)	0.164

Note: No significant difference at 0.05 appeared. For Chi-square, test results are based on nonempty rows and columns in each innermost sub-table.

It can be noticed that, with respect to occupation, the non-user sub-sample includes slightly more unemployed respondents than the other sub-sample. However, no significant association was recorded between usage variable and work status overall, a fact that points towards a satisfactory matching. In some cross analyses, I separated very experienced users from lower experienced and non-users. Although the matching was accomplished for the three sub-samples only in terms of gender and education, it was possible to isolate the effects of work status and age on the studied variable.

Table 3. Split by the degree of experience with the medium. All respondents (Base 151)

		indicator comprised								
		Less experienced			Very experienced			Non-users		
		Column		Mean	Column %		Mean	Column		Mean
		Count	%		Count	Column %		Count	%	
Gender	male	19	61%		34	68%		46	66%	
	female	12	39%		16	32%		24	34%	
Education	Low	7	23%		6	12%		5	7%	
	Medium	13	42%		24	48%		28	41%	
	High	11	36%		20	40%		35	52%	
age				28			33			36

A better matching of sub-samples was obtained for the split by an extended experience degree within the user sub-sample only.

Table 4. Split by the degree of experience with the medium (only mobile users. Base 76).

		Experience degree of only users (Base 76)								
		Low experience			Medium			High		
		Count	Column %	Mean	Count	Column %	Mean	Count	Column %	Mean
Gender	male	15	58%		16	55%		18	86%	
Sig Chi-square	female	11	42%		13	45%		3	14%	
0.06										
Education	Low	6	23%		3	10%		3	14%	
Sig Chi-square	Medium	11	42%		13	45%		11	52%	
0.69	High	9	35%		13	45%		7	33%	
Age										
Kruskall Wallis				28			33			34
P=				0.066						

The influence of the other unmatched variables was also taken into account into analyses.

4.2.3. Research Stages

Stage I: Formulation of study problem, hypotheses and concept operationalization (completed between 1.6.2001-1.11.2001)

The study problem in the empirical study is whether specific communication, perception and spatial behavior patterns can be differentiated in terms of mobile phone usage. The main working hypothesis is that mobile telephony usage associates with specific intertwined communication and movement structures. Other specific hypotheses cope with several dimensions of this process. These hypotheses, their operationalization, and the related item generation are presented below:

Table 5. The main constructs and their operationalization

MAIN CONSTRUCTS MOBILE COMMUNICATION/COMMUNICATIVE MOBILITY		Operationalization
<i>Dispositif dimensions</i>	Related hypotheses	Items/Questions (English translation of the German questions ⁷⁹)
Frame of functions and usage (Programs)	<ul style="list-style-type: none"> Mobile phones are primarily used for communication and orientation /planning Most used function: "voice telephony" and SMS 	<p>2.6 <i>How often do you use the following functions and applications of the mobile phone?</i></p> <p>2.7 and 2.8 <i>Which of the mobile phone applications are the most important for you? But the least important?</i></p> <p>2.11 <i>Do you use your private mobile phone also in the professional area?</i></p>
Rebuilding of mobile communication	<p>Communication Content The verbal content in mobile telephony enables the micro coordination of everyday life. SMS communication favors expressive and instrumental uses.</p>	<p>3.1. <i>What do you discuss most often, when you engage in face to face conversation with friends, relatives? What are the typical conversation issues?</i></p> <p>3.2. <i>What do you discuss on the mobile phone? What are the typical issues?</i></p> <p>3.3. <i>About what do you avoid to discuss on the mobile phone?</i></p> <p>3.4. <i>How long is your typical mobile phone conversation?</i></p> <p>3.6. <i>What are the usual issues when you send SMS?</i></p>
	<p>Communication partners Examination of target communicators (a) symmetry in relation</p>	<p>2.12 <i>Who is your typical conversation partner in string phone conversation? But in mobile phone conversation?</i></p> <p>2.13 <i>Who is your typical conversation partner in SMS exchange? But when you exchange e-mails over the Internet?</i></p>
	<p>Communicative actions Shift: Mobile telephony absorbs situational potential from other communication forms, in specific communication situations. Arrangements produced by other media cooperate in constructing mobile communication</p>	<p>2.15 <i>Which of the communication media and forms from the table below are suitable for the usage in the following situations?</i></p> <p>24 situations (see Appendix 1) formulated for the comparison of 8 communication forms: face to face, chat, fixed phone, mobile phone conversation, mobile phone SMS, fax, letter, e-mail</p>
	<p>Affects/Feelings In comparison to face to face, fixed phone, chat conversation, mobile/SMS induces:</p> <ul style="list-style-type: none"> freedom Increased power Increased stress entertainment/comfort Increased closeness Increased fear Increased answer pressure 	<p>4.1.1 (for informal) and 4.1.2 (for informal situations) <i>What do you feel when you use the communication media and forms listed in this table?</i></p> <p><u>Categories:</u> face-to-face communication, E-mail over the Internet, string phone conversation, mobile phone conversation, SMS, letters</p> <p><u>Items:</u></p> <ul style="list-style-type: none"> <i>I feel free to do anything and to talk about everything</i> <i>I feel powerful; I am the one who controls the conversation</i> <i>I feel tense, stressed</i> <i>I really enjoy it</i> <i>I feel closer to the conversation partner</i> <i>I feel hectic and impatient</i> <i>I am afraid that something unpleasant is going to happen</i> <i>I can fully understand what the partner means</i> <i>I feel compelled to answer</i>

⁷⁹ For the original German version please see the questionnaire in Appendix.

MAIN CONSTRUCTS MOBILE COMMUNICATION/COMMUNICATIVE MOBILITY (continuation)		Operationalization
<i>Dispositif dimensions</i>	Related hypotheses	Items/Questions
Rebuilding of communicative mobility	Travel coordination There are reciprocal effects between mobile telephony usage and the amount of travel	2.16. <i>Which effects does the usage of the mobile phone/string phone have on the organization of private/ professional travel?</i> (3 point scale) An item in question 5.1 <i>"I am always on the way, I travel more and more"</i> (5 point scale)
	Localization frame There are specific places to perform mobile calls	2.10. <i>Where are you when you usually phone from your mobile phone? But where is your most often private partner?</i>
	Mobility Technology usage structures the coordination of remote mobility	2.1. <i>How much time do you usually spend on the way? (in the car, train, bus, bicycle, by foot etc.) ?</i> <i>Commuting travel (hours /day), irregular professional travel (hours/day), holiday travel(days/year), other private travel (days/year)</i> 2.2. <i>How long do you usually travel to the following destinations?</i> <i>(medium distance)</i> <i>In the close neighborhood</i> <i>In the same city area</i> <i>In the same city</i> <i>In the federal state _____</i> <i>In the federal territory _____</i> <i>Abroad. Please specify _____</i>
	Distance perception and orientation <ul style="list-style-type: none"> • Mobile telephony usage leads to the perception of proximity in communication between partners • Mobile telephony usage is associated with a good spatial orientation 	5.2 (partly) <i>To what extent do you agree with the following statements?</i> Item: <ul style="list-style-type: none"> • <i>When you talk on the mobile phone you have the impression that distances become shorter. You feel closer to the partner</i> • <i>I can orient myself very well in the city or elsewhere</i>
Temporal effects <ul style="list-style-type: none"> • Mobile phone usage leads to an time compression, hurry • Simultaneous chronotype associated with handy usage 	2.9 <i>How much do you talk on the mobile phone in the morning, mid-days, in the afternoon, in the evening, nights?</i> 5.2. one opinion item: <i>Mobile phone users seem to be always in a hurry</i> 5.1. <i>To what extent do you agree with the following statements?</i> (5 point scale) <ul style="list-style-type: none"> • <i>One should always be punctual</i> • <i>I do things one after another</i> • <i>I take schedules very seriously. They can be broken only out of very serious reasons</i> • <i>Family and social relations are more important for me than profession</i> • <i>I am often hurried and impatient</i> • <i>I prefer to work in the presence of other persons</i> • <i>I live in the present, I am not so interested in the past .</i> • <i>I make often plans for the future</i> 	

MAIN CONSTRUCTS MOBILE COMMUNICATION/COMMUNICATIVE MOBILITY (continuation)		Operationalization
<i>Dispositif dimensions</i>	Related hypotheses	Items/Questions
The constituted user and technology	<p>Attitudes towards users and mobile phones in general.</p> <ul style="list-style-type: none"> • There are differences across subgroups: users and non-users • Mobile communicators tend to have more positive perceptions of the technology and its usage than non-users 	<p>5.2 (partly) <i>To what extent do you agree with the following statements?</i> dichotomic variables:</p> <ul style="list-style-type: none"> • <i>The mobile phone connects people</i> • <i>Who wants to have success has to use a mobile phone</i> • <i>Mobile phones are dangerous for health</i> • <i>Mobile phones are complicated, difficult to use devices</i> • <i>Mobile phones must not be used in public places</i>
	<p>Image of cell phone communicators/</p> <ul style="list-style-type: none"> • There are differences across subgroups: users and non users • Mobile communicators tend to perceive a more favorable image of mobile users • Differences in the assessment of target population between users and non users 	<p>F5.2 (partly) <i>To what extent do you agree with the following statements?</i> (dichotomic) Items:</p> <ul style="list-style-type: none"> • <i>Mobile phones users plan better their lives</i> • <i>Mobile phone users have more friends than non-users</i> • <i>Mobile phone users are annoying</i> • <i>Mobile phone users are modern</i> • <i>Mobile phones are particularly suitable for businessmen</i> • <i>Mobile phones are particularly suitable for teenager</i> • <i>Mobile phones are particularly suitable for active people</i> • <i>Mobile phones are particularly suitable for conversation with family members or relatives</i> • <i>Mobile phones are particularly suitable for work conversations</i> <p><i>Mobile phones are particularly suitable for old persons</i></p>

Stage II: Construction of the structured questionnaire and translation in German

After operationalization, a structured questionnaire was constructed. The questionnaire contains open-ended and pre-coded questions, and scales. This begins with some easy introductory personal questions (partial demographics). It continues with a question group for assessing mobility in everyday life. Then, it enters the area of communication media usage: places; day periods; communicators; and communicative actions/situations. This is the most difficult part, placed therefore in the middle of the questionnaire. Then, the third section asks about communication contents in face-to-face, mobile and SMS. The assessment of the affective reactions in various communication situations comes next in the fourth section. It continues with a battery of time and distance perception scales and with attitudes about mobile phones and mobile communicators. The remaining demographic questions end the questionnaire.

Stage III: Pre-testing the questionnaire

Between 1.11.2001 and 1.04 2002, a draft questionnaire version was used for the pre-testing of the comprehension of the questions and organization of the sequel. Pre-test interviews provided an important means of finding out directly from respondents what their problems are with the questionnaire. More specifically, they yielded information about major problems—such as respondents repeatedly identifying the same questions and concepts as sources of confusion. After analysis of the pre-test results, several modifications were implemented because the first draft of the questionnaire completion proved to be rather difficult and lengthy for some subjects. The answers to some open-ended questions were transformed in scale statements. Items that produced relatively little information and did not discriminate well were excluded from research. Also, some difficult 5-point scales were turned into binary yes/no. In this way, the revised questionnaire contained fewer items as before and was more comprehensive.

Stage IV: Data collection

Between 1.04.2002 and 1.07.2002, an online German version of the questionnaire was constructed. On July 2002, the survey was implemented on the WWW at the homepage: <http://www.ifs.tu-darmstadt.de/gradkoll/Umfrage.html>. Additionally, a message was sent to 20 newsgroups and forums. The message explained the purpose of the study, and provided direction for completion of the survey and the URL of the online questionnaire. I also prepared e-mail messages for persons whose private homepages I discovered on the WWW.

Stage V: Coding and entering data

The inputs from mobile phone users and non-users on the WWW were converted with a CGI script provided by the **Formular Chef** tool in <http://www.nettz.de> to numerical codes and text. A database table was constructed in SPSS, and 486 variables were defined in terms of measurement level, type, and label.

Stage VI: Data analysis framework

The general schema for conducting statistical analysis includes classification of variable types, description of procedures best suitable for each variable type and their applicability for testing specific hypotheses.

The numerical data in the present study were subjected to various statistical analyses. The Statistical Package for Social Science (SPSS) was used to conduct analyses of the collected data. The collected data include two groups: closed-ended questionnaire data and open-ended questionnaire data.

All the closed-ended questions were converted to numerical values and stored in the data table. Ratio; interval; ordinal; multiple nominal and binary variables resulted. The statistical tools, which analyze interval and ordinal data, are: frequency distributions; cross tabulations; and the parametric or non-parametric tests of differences (if the distribution not normal). Difference tests can be used to compare the means of two or more groups - for example, users and non-users of mobile phones on the values of the variables. Because, in the majority of cases, the data were not normally distributed; only non-parametric tests of difference

(Kruskall Wallis for multiple comparisons or Mann-Whitney for two independent samples) could be used. Also, if data assumptions for correlation and regression are fulfilled, correlation and regression analysis may be performed. The bivariate correlation computes Pearson's correlation coefficient for interval variables, Spearman's rho for ordinal, and Kendall's tau-b and Lambda for nominal variables with their significance levels. Correlations measure how variables or rank orders are related: for example, mobility in hours with frequency of technology usage (scale), SMS usage frequency with age, or mobile telephony usage with nominal variables describing affective perceptions of wireless telephony.

Data reduction is useful to position the subjects in a bi-dimensional or tri-dimensional field. For instance, the Principal Component Analysis can be used in data reduction to identify a small number of factors, which explain most of the variance observed in a much larger number of manifest variables. This reduction was applied for the scales describing usage frequency of various mobile functions (F2.6) or for the usage situations in the pre-test phase. The same objective can be fulfilled by Multidimensional Scaling procedure, which "assigns observations to specific locations in a conceptual space (usually two- or three-dimensional), such that the distances between points in the space match the given dissimilarities as closely as possible"⁸⁰. The hierarchical cluster attempts to identify relatively homogeneous groups of cases (or variables) based on selected characteristics, using an algorithm that starts with each case (or variable) in a separate cluster and combines clusters until only one is left. With the help of this technique, I clustered communication forms (face-to-face; chat; fixed telephone; mobile phone; Fax; letters; e-mail) in question 2.15 based on usage situations, after constructing a special matrix for this analysis.

For binary and multiple nominal variables, specific analysis tools were used. Cross Tabulations were employed to indicate the relationship between two categorical variables - for example, the mobile phone usage and various localization or affective variables.

Finally, the responses to the open-ended questions were tabulated as frequency counts.

4.3. Detailed Findings

This chapter examines how wireless telephony integrates into daily life and rebuilds the interlaced communication and movement structures. First, focus will be placed on the analysis of the programs: the differential usage of functions and applications of mobile telephony. Specific categories of users will be characterized. Further, the communicative dimension of the *dispositif* will be analyzed: the content; actions; affective reactions; situations; and relations with other media. Emphasis will be then placed on the spatial/temporal dimension of the *dispositif*: mobility, places, and chronotypes. Finally, the social interaction and the attitudinal/representational dimension of the *dispositif* will be explored.

With reference to all these aspects, it should be noted that no strictly deterministic perspective is followed in the analysis; namely, mobile telephony usage is not regarded as the central cause of the revealed modifications of communication, space, time and social experience. The exploratory study tries to emphasize the intertwined action of technical structures with the unstable and complex human dispositions. Therefore, the general approach is rather associative and classificatory.

⁸⁰ Cf. SPSS help.

4.3.1. Contextualization of the Study - General Coordinates of Usage Programs

The questionnaire includes a group of questions about usage frequency of mobile phones, brands, tariff type and functions used in mobile communication. Although the answers to these questions are not to be generalized to the global population, they are useful for the contextualization of the study and for cross analyses.

More than 75% of cell phone respondents used SMS and WAP-equipped Nokia and Siemens brands (see table 1). In terms of payment, the majority of users preferred the usual tariff plan based on a monthly fee.

Table 1. Brands in the study

	Frequency	Valid Percent
Nokia	35	46
Siemens	26	35
Ericsson	3	5
Motorola	3	4
Sony	3	4
Triumph	2	3
Panasonic	1	1
Alcatel	1	1
Other	1	1
Total	76	100

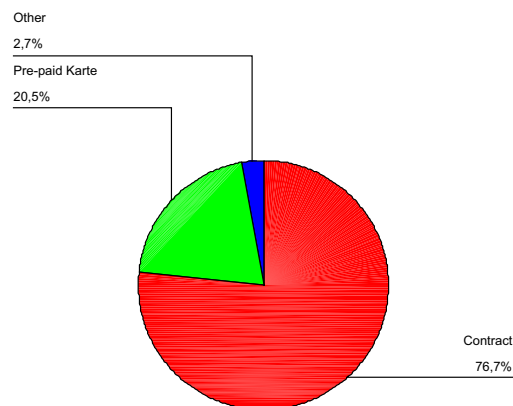


Figure 1: Type of payment

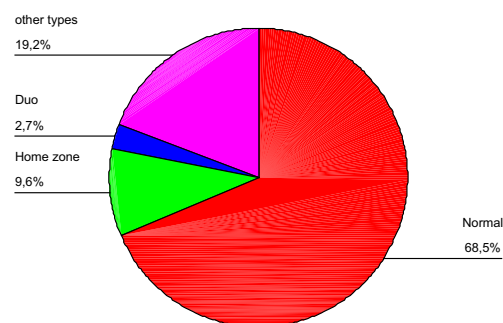


Figure 2. Type of contract

In addition, respondents were asked to assess their usage frequency of various applications and functions of mobile telephony defining the technology usage programs. These ranged from basic applications like voice-communication, information access through WAP, localization and entertainment to maintenance and comfort functions. The current study catches a momentum when 3G mobile phones with enhanced Internet, navigation, and video capabilities have not established their position on the market yet. From Table 2, it can be observed that the most frequently used (almost daily) functions were: key lock; phonebook; voice-communication; SMS; vibrate mode; and clock. Multi-party calls; SMS-chat; the wireless Internet; and e-mail on the Internet represented the least frequently used applications.

Table 2. The current “programs”. Frequency of usage of various applications and functions in mobile telephony

APPLICATIONS	N*	Minimum	Maximum	Mean	Std. Deviation
Key lock	75	1	5	4.55	1.18
Phone directory	75	1	5	4.21	1.02
Verbal telephony	75	1	5	4.20	1.04
Vibrate mode	66	1	5	3.92	1.29
SMS	75	1	5	3.83	1.20
Clock	73	1	5	3.79	1.52
Last calls	73	1	5	3.66	1.24
Redial	74	1	5	3.36	1.43
Agenda/PDA	65	1	5	2.68	1.51
Mobilbox	73	1	5	2.63	1.41
Calendar	62	1	5	2.55	1.52
Ringtones	74	1	5	2.50	1.33
Mp3 player	17	1	5	2.41	1.66
One touch	69	1	5	2.33	1.42
Calculator	68	1	5	2.18	1.05
Call forwarding	70	1	5	2.04	1.35
Data transfer	55	1	5	2.00	1.28
Games	67	1	5	1.91	1.10
E-mail on the Internet	58	1	5	1.86	1.28
Internet	55	1	5	1.78	1.05
Im Gespräch	52	1	5	1.73	1.01
Navigation	17	1	5	1.59	1.18
Multi-party calls	56	1	4	1.32	.72
SMS Chat	38	1	4	1.24	.63
Other	11	1	5	3.09	1.87

Notes: The question was formulated as follows:

2.6. How often do you use the following functions and applications of the mobile phone?

The answers were rated on a 5-point scale, from 1 (never) to 5 (many times a day).

*missing answers represent no function available plus don't know

Cross analysis by gender (Table 2) and age (Table 3) revealed some differences in the internal structure of applications usage. Overall, male users phoned (both called and were called⁸¹ and

⁸¹ The results are not surprising. Although the fixed phone undoubtedly privileged women - at least in all those social settings where females are still expected to stay at home while males are more likely to be on the move,

used the Mailbox more frequently than female users, but women tended to send and receive SMS slightly more frequently than men did. Gender discriminated also in the usage frequency of enhanced functions like Internet access, data transfer and e-mail on the Internet - applications that were more frequently accessed by male users.

Table 3. Cross analysis by gender - the most frequently used functions

	Male users (Base 49)			Female users (27)		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
Verbal communication*	4.43	5.00	.84	3.77	4.00	1.24
Mobilbox*	3.00	3.50	1.41	1.92	1.00	1.12
SMS	3.71	4.00	1.12	4.04	5.00	1.34
Phone directory	4.29	5.00	.94	4.08	4.50	1.16
Clock	3.88	5.00	1.42	3.63	5.00	1.71
Ring tones	2.63	2.00	1.39	2.24	2.00	1.16
Redial	3.51	4.00	1.31	3.08	3.00	1.63
Calendar	2.40	2.00	1.47	2.85	2.50	1.63
Agenda	2.59	2.00	1.51	2.86	3.00	1.53
Last calls	3.79	4.00	1.18	3.42	4.00	1.33
One touch	2.52	2.00	1.50	2.00	2.00	1.22
Vibrate mode	4.05	5.00	1.28	3.68	4.00	1.32
Key lock	4.57	5.00	1.17	4.50	5.00	1.21
Calculator	2.15	2.00	.99	2.23	2.00	1.19
Internet**	2.00	2.00	1.09	1.29	1.00	.77
Data transfer*	2.21	2.00	1.32	1.50	1.00	1.03
E-mail on the Internet**	2.26	2.00	1.39	1.05	1.00	.23
Games	1.82	1.00	1.06	2.09	2.00	1.16
Mp3 player	2.45	2.00	1.51	2.33	1.00	2.07
Call forwarding	2.15	2.00	1.43	1.82	1.00	1.14
Multi-party calls	1.41	1.00	.81	1.07	1.00	.26
Navigation/GPS	1.77	1.00	1.30	1.00	1.00	.00
Im Gespräch	1.91	2.00	1.12	1.35	1.00	.61
SMS Chat	1.26	1.00	.66	1.18	1.00	.60
Other	3.44	4.00	1.88	1.50	1.50	.71

Notes: the answers were rated on a 5-point scale, from 1 (never) to 5 (many times a day).

**The Mann-Whitney test gave highly significant results (p 0.01)

*The Mann-Whitney test gave significant results (p 0.05)

Cross analysis by age (Table 4) outlined some tendencies of the younger users (teens plus Young) in the sample to send SMS more frequently, to use the clock in mobile phones more often and to play games more frequently than the other categories. Yet, the mature segment seemed to access the wireless Internet more often than the other categories. Finally, the older segment used the call-forwarding facility more often than the younger ones.

the cell phone has weakened (or even reversed) this gender gap. Recent statistics show that men surpass women here to a considerable extent (Geser, 2003).

Table 4. Cross analysis by age - the most frequently used functions

Functions	up to 27 (Base 28)			28-37 (Base 28)			38-65 (Base 20)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Verbal communication	4.26	5.00	.98	4.14	4.50	1.08	4.20	5.00	1.11
Mobilbox	2.19	1.50	1.36	2.78	3.00	1.28	3.00	3.50	1.56
**SMS	4.44	5.00	1.05	3.54	4.00	1.23	3.40	3.50	1.05
Phone directory	4.44	5.00	.75	4.11	4.00	1.03	4.05	5.00	1.28
**Clock	4.42	5.00	1.24	3.68	4.50	1.52	3.11	4.00	1.59
Ring tones	2.74	2.00	1.38	2.29	2.00	1.24	2.47	2.00	1.39
Redial	3.59	4.00	1.34	3.39	3.00	1.47	3.00	2.00	1.49
Calendar	3.17	3.00	1.54	2.36	2.00	1.38	2.21	2.00	1.58
Agenda	3.00	2.50	1.54	2.44	2.00	1.39	2.61	2.00	1.65
Last calls	3.88	4.00	1.03	3.74	4.00	1.26	3.25	3.50	1.41
One touch	2.44	2.00	1.50	2.04	2.00	1.31	2.58	2.00	1.46
Vibrate mode	4.36	5.00	.95	3.48	4.00	1.45	3.94	4.50	1.34
Key lock	4.85	5.00	.77	4.32	5.00	1.42	4.45	5.00	1.23
**Calculator	3.00	3.00	1.11	1.89	2.00	.75	1.63	2.00	.76
*Internet	1.44	1.00	.70	1.70	1.00	1.13	2.24	2.00	1.15
Data traffic	2.19	1.50	1.52	1.83	1.00	1.19	2.06	2.00	1.18
E-mail on the Internet	1.83	1.00	1.50	1.59	1.00	1.05	2.22	2.00	1.26
*Games	2.25	2.00	1.11	1.56	1.00	.87	1.94	1.50	1.26
Mp3 player	2.33	1.50	1.75	3.00	3.00	1.83	2.14	1.00	1.68
**Call-forwarding	1.62	1.50	.70	1.85	1.00	1.41	2.94	2.50	1.59
Multi-party calls	1.26	1.00	.56	1.18	1.00	.66	1.60	1.00	.91
Navigation/GPS	1.33	1.00	.52	1.67	1.00	1.63	1.80	1.00	1.30
Im Gespräch	2.00	2.00	1.03	1.56	1.00	1.10	1.57	1.00	.85
SMS Chat	1.29	1.00	.83	1.17	1.00	.58	1.25	1.00	.45
Other	3.67	5.00	2.31	2.33	1.00	2.31	3.20	4.00	1.64

Notes: the answers were rated on a 5-point scale, from 1 (never) to 5 (many times a day).

**The Kruskal Wallis test gave highly significant results (p 0.01)

*The Kruskal Wallis test gave significant results (p 0.05)

Additional descriptive statistics for the teenagers group only (Base 12) emphasized their tendency to employ the vibrate mode very frequently (mean 4.67 out of 5)—an interesting sign of their compliance with the non-disturbance requirements of the context.

Further, a synthetic variable of the degree of the experience with the medium was constructed, taking into consideration both the usage frequency and the length of mobile phone usage. It was counted after the following formula: $Experience\ with\ the\ medium = Usage\ frequency * Time\ of\ ownership / 100$. Three tiles of this variable (low, medium and high experience) were employed in the subsequent cross-analyses. As presented in Table 5, the degree of usage experience discriminated across the frequency usage of voice communication, mobilbox, SMS, Phonebook, ring-tones, agenda/PDA, and call-forwarding functions. Very experienced users tended to use significantly more often the voice application, mobilbox, SMS, phone book, and call forwarding than less experienced ones. The existence of differences between the medium and the less experienced users, in what concerns the call forwarding, ring-tones and agenda, and between the medium experienced and the high experienced users, regarding voice communication, indicates the gradual structuration of the functions and usage frame within the *dispositif*. By itself the usage frequency of agenda application (*Erinnerung*) seemed to decrease with high usage, as if some users would have become disappointed or not interested in the function any more.

Table 5. Cross analysis by usage experience index- the most frequently used functions

Functions	Categories of the index of the experience with the technology								
	Low (Base 26)			Medium (Base 29)			High (Base 21)		
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev
Verbal communication**	3.81	4.00	1.06	4.11	5.00	1.17	4.81	5.00	.40
Mobilbox*	2.08	2.00	1.15	2.59	2.00	1.42	3.33	4.00	1.43
SMS°	3.42	4.00	1.36	3.86	4.00	1.18	4.29	4.00	.85
Phone directory*	3.85	4.00	1.05	4.25	5.00	1.08	4.62	5.00	.74
Clock	3.36	4.00	1.60	4.04	5.00	1.48	4.00	5.00	1.41
Ring tones	2.08	2.00	1.04	2.86	2.00	1.43	2.52	2.00	1.40
Redial	3.16	3.00	1.37	3.25	3.00	1.65	3.76	4.00	1.14
Calendar	2.17	2.00	1.38	2.77	2.50	1.58	2.61	2.00	1.58
Agenda*	2.24	2.00	1.48	3.28	3.00	1.43	2.37	2.00	1.46
Last calls	3.32	3.00	1.31	3.81	4.00	1.30	3.86	4.00	1.01
One touch	2.09	2.00	1.16	2.14	2.00	1.46	2.94	2.00	1.55
Vibrate mode	3.67	4.00	1.34	4.08	5.00	1.22	4.06	5.00	1.34
Key lock	4.42	5.00	1.30	4.75	5.00	.80	4.43	5.00	1.43
Calculator	2.27	2.00	1.12	2.11	2.00	.97	2.16	2.00	1.12
Internet	1.53	1.00	.84	1.74	1.00	.99	2.12	2.00	1.27
Data traffic	1.89	1.50	1.18	2.00	2.00	1.19	2.11	1.00	1.49
E-mail on the Internet	1.58	1.00	1.12	1.81	1.00	1.08	2.22	1.50	1.59
Games	1.83	2.00	1.03	1.88	2.00	1.11	2.06	2.00	1.21
Mp3 player	2.67	2.00	1.86	2.40	1.00	1.95	2.17	1.50	1.47
Call-forwarding*	1.58	1.00	1.02	2.00	2.00	1.30	2.65	2.00	1.57
Multi-party calls	1.21	1.00	.54	1.33	1.00	.77	1.42	1.00	.84
Navigation/GPS	1.29	1.00	.49	1.00	1.00	.00	2.33	1.50	1.75
Im Gespräch	1.68	2.00	.82	1.47	1.00	.62	2.06	1.00	1.44
SMS Chat	1.38	1.00	.89	1.11	1.00	.33	1.15	1.00	.38
Other	2.00	1.00	2.00	2.75	3.00	1.50	5.00	5.00	.00

Notes: The answers were rated on a 5-point scale, from 1 (never) to 5 (many times a day).

**The Kruskal Wallis test gave highly significant results (p 0.01)

*The Kruskal Wallis test gave significant results (p 0.05)

° The Kruskal Wallis test gave slightly significant results (p 0.1)

Analysis across education categories (Table 6) has emphasized that lower educated users were indeed drivers of wireless technology usage. They tended to send SMS more often than the older ones and to use applications, which require detailed technology knowledge and experience (ring tones, calendar, calculator, clock, etc.), more frequently. Interestingly, they seemed to access more often the function giving access to the last calls, either taken or lost, a fact that confirmed their extended network of social connections and their need to manage this complexity. Top applications for the medium educated segment were, in this order: key lock; phone directory; SMS; the vibrate mode; last calls; voice communication; repeat; ring-tone; calendar; agenda. The WAP and e-mail on the Internet were rather rarely employed. Yet, medium-educated users frequently used voice communication; phone directory; the clock; the vibrate mode; and SMS and paid less attention to the wireless Internet and its facilities. Almost the same pattern characterized the behavior of higher educated users.

Table 6. Cross analysis by education - the most frequently used functions

Functions	Low (base 12)			Medium (base 35)			High (base 29)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Verbal communication*	4.25	4.50	.97	4.50	5.00	.86	3.83	4.00	1.17
Mobilbox	2.55	3.00	1.37	2.68	2.50	1.53	2.61	2.50	1.31
SMS**	4.58	5.00	.90	4.00	4.00	1.04	3.31	4.00	1.28
Phone directory	4.58	5.00	.51	4.32	5.00	1.09	3.93	4.00	1.03
Clock**	4.58	5.00	1.16	4.06	5.00	1.39	3.17	3.00	1.58
Ring tones**	3.58	3.50	1.38	2.58	2.00	1.46	1.97	2.00	.78
Redial	4.00	4.00	1.21	3.42	4.00	1.39	3.03	3.00	1.50
Calendar*	3.78	4.00	1.20	2.59	3.00	1.60	2.08	2.00	1.32
Agenda*	3.60	3.50	1.35	2.76	2.00	1.62	2.23	2.00	1.31
Last calls*	4.42	5.00	.79	3.70	4.00	1.16	3.29	3.00	1.36
One touch	3.00	3.00	1.49	2.29	2.00	1.53	2.12	2.00	1.20
Vibrate mode	4.42	5.00	1.00	4.00	4.50	1.28	3.62	4.00	1.39
Key lock	4.67	5.00	1.15	4.76	5.00	.85	4.24	5.00	1.46
Calculator**	2.78	3.00	.97	2.39	2.00	1.15	1.75	2.00	.80
Internet	1.50	1.00	.76	2.12	2.00	1.24	1.50	1.00	.80
Data traffic	2.38	2.00	1.41	2.26	2.00	1.42	1.63	1.00	1.01
E-mail on the Internet	2.33	2.00	1.58	2.12	1.00	1.48	1.39	1.00	.66
Games*	2.55	2.00	1.21	1.97	1.50	1.22	1.58	1.00	.76
Mp3 player	2.67	2.00	2.08	3.00	4.00	1.63	1.71	1.00	1.50
Call-forwarding	1.83	2.00	.94	2.18	2.00	1.49	1.96	1.00	1.34
Multi-party calls*	1.63	1.50	.74	1.39	1.00	.83	1.10	1.00	.45
Navigation/GPS	1.33	1.00	.58	2.33	1.50	1.75	1.13	1.00	.35
Im Gespräch*	2.38	2.00	1.19	1.84	2.00	1.11	1.32	1.00	.58
SMS Chat	1.38	1.00	1.06	1.13	1.00	.35	1.27	1.00	.59

Notes: **The Kruskal Wallis test gave highly significant results (p 0.01)

*The Kruskal Wallis test gave significant results (p 0.05)

According to the analysis across the main occupational categories in this study (Table 7), students and pupils constituted heavy users of SMS, clock and calculator applications. Employed people used the mailbox significantly more often than other categories, but not more than once a month. Top applications for employed people in the sample were: key-lock; voice communication; phone directory; vibrate mode; clock; last calls; SMS; and call forwarding. At this time, the wireless Internet (with e-mail and other applications) and location-based services had not massively diffused yet; therefore, these categories were characterized by low interest and usage frequency. The majority of studying respondents frequently employed the key lock; phone directory; SMS; the clock; voice communication; vibrate mode; and call-forwarding. New value-added applications, like data transfer and e-mail on the Internet, were scarcely used, although a small number of students/pupils were attracted by some new-implemented features like MMS or Location-Based-Services.

Table 7. Cross analysis by the work status- the most frequently used functions

Functions	Employed users (base 51)			Still studying users (base 21)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Verbal communication	4.24	5.00	1.04	4.24	5.00	1.00
Mobilbox*	2.96	3.00	1.40	2.05	1.00	1.28
SMS**	3.60	4.00	1.20	4.43	5.00	1.03
Phone directory	4.18	5.00	1.04	4.48	5.00	.68
Clock*	3.65	4.00	1.52	4.40	5.00	1.27
Ring tones	2.47	2.00	1.37	2.67	2.00	1.24
Redial	3.41	4.00	1.47	3.52	4.00	1.25
Calendar	2.48	2.00	1.53	3.17	3.00	1.53
Agenda	2.64	2.00	1.49	3.06	2.50	1.61
Last calls	3.64	4.00	1.21	4.05	4.00	1.03
One touch	2.44	2.00	1.49	2.06	1.50	1.26
Vibrate mode	3.81	4.00	1.35	4.26	5.00	1.05
Key lock	4.50	5.00	1.22	4.62	5.00	1.20
Calculator**	1.91	2.00	.90	3.06	3.00	1.03
Internet	1.88	1.50	1.14	1.50	1.00	.80
Data traffic	2.02	2.00	1.29	2.00	1.00	1.41
E-mail on the Internet*	2.00	1.00	1.30	1.31	1.00	.85
Games	1.80	1.00	1.04	2.06	2.00	1.11
Mp3 player	2.10	1.00	1.60	2.75	2.50	2.06
Call-forwarding	2.19	2.00	1.53	1.70	1.50	.80
Multi-party calls	1.36	1.00	.78	1.07	1.00	.27
Navigation/GPS	1.73	1.00	1.42	1.00	1.00	.00
Im Gespräch	1.62	1.00	1.04	2.00	2.00	1.00
SMS Chat	1.21	1.00	.51	1.27	1.00	.90
Other	3.00	4.00	1.91	5.00	5.00	.00

Notes: **The Mann-Whitney test gave highly significant results (p 0.01)

*The Mann-Whitney test gave significant results (p 0.05)

The answers to the open-ended questions about the important and unimportant applications of the wireless communication technology generally confirmed the results above. Overall, respondents considered that the most important functions at that time were voice telephony and SMS:

Table 8. The most important applications in mobile telephony. Answers to the open-ended question: *Which of the mobile phone applications are the most important for you?*

Dimension	Number of cases	Pct of responses (Base 95)	Pct of cases (base 76 mobile users)
Communication (voice and SMS together)	66	69	89
Keep in touch functions (phone directory, last calls)	8	9	18
Temporal functions (calendar, clock, Termine)	7	7	10
Vibrate mode	5	5	7
Data traffic	2	2	3

Note: Multiple answers. Only users of mobile phones answered this question

One of the spontaneously mentioned important applications was the *vibrate mode*. This proved that mobile phone users were aware of the potential disturbing effects of their usage and tried to comply with some social rules of the public space. The entertainment frame, including games and MP3 player, had not been considered important in wireless technology usage, yet. The majority of user respondents also attributed no importance to SMS chats, a fact that indicates that, at that time, attempts to establish the M-community niche were still in their infancy. Not surprisingly, (given the result of some studies presented in the previous chapter), a significant percent of users regarded the wireless Internet as unimportant, too.

The study also asked about the usage of the technology in the private and/or in the work spheres (Figure 3). Results emphasized a significant usage of the private mobile phone in the professional area, too, an indication that signaled the mixing of personal and work spheres in the process of technology domestication.

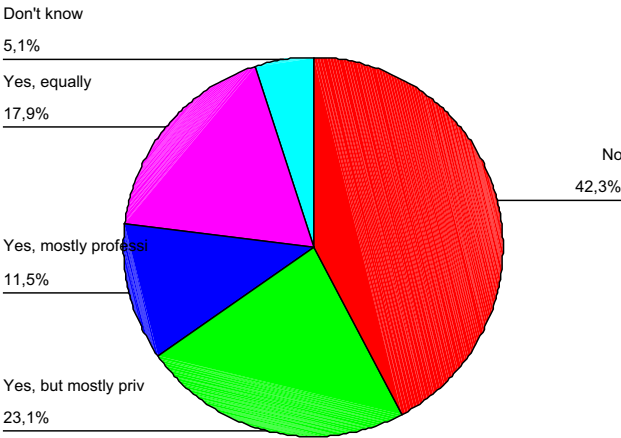


Figure 3. Answers to the question: *Do you employ your mobile phone also in your profession?*

More than a half of users recognized that they also employed their mobile phone in their profession, when needed. Cross analyses of this variable with gender produced some other interesting output: although patterns of private/professional usage of men and women were balanced, female users in the current study seemed to be less ready to use their mobile in the professional sphere than male users (see Table 9). In general, mature users tended to employ the mobile phone equally for profession and in the private sphere. In addition, medium-educated users were inclined to use their own mobile phone in the professional sphere more frequently than the other education categories.

Table 9. Usage of the mobile phone in private/professional area. Cross analysis by gender

	gender			
	Male (Base 49)		Female (Base 27)	
Usage in work	Count	Column %	Count	Column %
No	16	33	15	63
Yes, but mostly private	12	25	4	17
Yes, but mostly professional	8	17	1	4
Yes, equally in the private and the professional life	10	21	3	13
Don't know/NA	2	4	1	3

Table 10. Usage of the mobile phone in the professional area. Cross analysis by age

	Age					
	Up to 27 (Base 28)		28-37 (Base 28)		More than 38 (Base 20)	
Usage in work	Count	Column %	Count	Column %	Count	Column %
No	14	56	10	36	7	37
Yes, but mostly private	5	20	7	25	4	21
Yes, but mostly professional	3	12	4	14	2	11
Yes, equally in the private and the professional life	1	4	7	25	5	26
Don't know/NA	2	8			1	5

Notes: * difference at p less than 0.05

Table 11. Usage of the mobile phone in private/professional area. Cross analysis by education

	Education					
	Low (Lase 12)		Medium (Base 35)		High (Base 29)	
Usage in work	Count	Column %	Count	Column %	Count	Column %
No	7	58	14	44	10	36
Yes, but mostly private	2	17	5	16	9	32
Yes, but mostly professional			8	25	1	4
Yes, equally in the private and the professional life	2	17	4	13	7	25
Don't know/NA	1	8	1	2	1	3

All in all, it can be said that the analysis of usage frequency of functions and applications in mobile telephony has been useful for the temporal contextualization of the wireless communication *dispositif*. The findings have indicated that, at the moment the study was conducted, the focus on the communication structure in the *dispositif*, at the expense of the information and agenda structures, represented a correct research strategy for the period before the introduction of 3G mobile phones (year 2003-2004). At that time, voice telephony with connected storage functions and SMS were considered the most important; therefore, they were the most frequently employed. The wireless Internet and the connected applications had not penetrated deep enough in order to provide the *dispositif* with information, supervising, or entertainment arrangements.

4.3.2. Analysis of the Mobile Communication Structure in the *Dispositif*

In the process of structure re-build of communication, the mobile telephony *dispositif* falls back on its un-technicised avatar, the face-to-face dialogue. The attempt to simulate the reality of the direct contact completes with a creative appropriation and integration of communication structures produced within competing *dispositives*: the fixed telephony; the e-mail on the Internet; the photography; and even the television. These continuous comparison and absorption efforts in the constitution of the mobile communication *dispositif* highly stimulate the research interest. Consequently, the present study contains:

- A part aiming to define mobile communication in relation to the *face-to-face* communication
- A comparative section dedicated to the positioning of both verbal and written mobile communication in the larger field of the currently used communication media and forms. Focus is placed on differences and similarities in content; partners; situations; and affective reactions.

4.3.2.1. Exploring the Re-building of the Mobile Communication Content

In order to understand the content of mobile communication and its relation with the face-to-face dialogue, I first asked respondents about their issues when talking face-to-face, then on the mobile phone and SMS. Both users and non-users produced a variety of sociable, informative or entertaining themes in their face-to-face conversations⁸². While spatial clues (*Treffpunkte*) and temporal references (*Termine*) accounted for less than 2% of issues, the majority of the mentioned issues pointed towards a complex and diverse content oriented towards construction and maintenance of social relations.

As shown in Table 1, verbal mobile conversation proved to be mainly oriented toward spatial-temporal coordination of partners (50% of responses). This category includes appointments; changes in the daily agenda; indication of meeting places; description of the calling place; etc. A kind of *ad-hoc coordination*, as Geser called it, allows mobile phone users to adapt to “unpredictable short-term changes in circumstances, opportunities, or subjective preferences and moods” (Geser, 2003). A quarter of answers (25% of responses) represented requirements to solve a problem or practical information. Social talk accounted for another 25% of mentioned themes. It should be acknowledged that the dominance of one or another dimension in the wireless telephony content is highly dependent on the purposes communication fulfills and the profile of the communicators. As Ross singled out:

“There are two antipodes of mobile telephone communication: the impersonal, short business communication: agreement on a date, place, delivery, a piece of information; and on the other hand the highly personal, intimate conversation with a spouse, relative, friend, lover.” (Ross 1993, quoted in Geser, 2003).

Table 1: Dimensions of verbal mobile communication content. Percents of answers to the open-ended question: About what do you speak at the mobile phone? What are the topics for discussion?

Dimensions		Pct. of responses (Base 125)	Cumulated pct. of responses	Pct. of cases (Base 76)	Cumulated pct. of cases*
Spatial and temporal coordination	Appointments (combined time and place references)	14	50	30	105
	Time clues only	25		52	
	Spatial clues only	11		23	
Task coordination	Problem solving information	25	75	52	157
Sociability	Sociable talk	25	100	52	209

Note: *Sum of pct. over 100 due to the multiple answers

⁸² For detailed codes see tables 3-4 in the Appendix.

The study emphasized the dominance of the short coordinative communication in mobile telephony. Indeed, mobile users avoided, on mobile phones, exactly the issues specific for the intimate face-to-face conversation (see Table 2). Cost and time constraints hindered issues requiring an explanation, a continuation of communication within the same conversation sequel. The eventual feedback was to be postponed or moved into another future communication unit⁸³. Mobile verbal communication presented a distinct communication structure, which could not overlay the basic face-to-face paradigm irrespective of the strong propensity towards it. I agree with Fortunati (2002) in concluding that mobile verbal conversation represents rather a “short exchange” than a true communication in terms of style and content.

Table 2. Avoided issues in mobile verbal communication. Open-ended answers to the question: What themes do you avoid to speak on the mobile phone?

Dimension	Pct of responses	Pct of cases (base 76)
Long stories	32	41
Very private matters	28	37
Money	13	17
Negatives	11	15
other	16	22
Total	100	132*

Notes: *Multiple answers. Sum of pct.over 100

This finding was confirmed by the results about the length of mobile conversation in minutes. A tendency of lower-educated people, women and students or pupils to speak longer was identified, revealing the propensity of these categories to exploit the medium more. This shortness does not necessarily imply a lack of creativity or high stereotypy, but it may encourage in-group languages⁸⁴.

Table 3. Length of conversation in minutes. Means

	Mean (in minutes)	Std. Dev.
Minutes	4.98	5.687

⁸³ As Geser also observed, “Given the (still) rather elevated time-based fees for audio-connections on the one hand and the very low bandwidth of SMS on the other, it is evident that cell phones are not very useful when highly complex, elaborate communication has to be activated. Instead, their functionality is most dramatically shown in contexts where a rather “restricted code” can be used, as for instance: 1) among very close partners who share the same “microculture” of symbolic meanings and language uses because they have been acquainted for a long time (e.g. elderly couples); 2) among individuals who share the same linguistic subculture (e.g. young people speaking the same peer-group jargon or incumbents of identical professional roles); 3) individuals who engage in highly standardized and routinized forms of cooperation or transaction where only a few words are necessary to transmit clear messages and to reach consensus (e.g. about business deals)” (Geser, 2003, online citation).

⁸⁴ Geser observed that : “contrary to the fixed phone which promoted the establishment of highly generalized linguistic forms (e.g. answering formats like “Hallo”, “Pronto” etc.), the cell phone may facilitate the emergence of linguistic habits peculiar to single families or friendship circles” (Geser, 2003).

Table 4. Length of conversation in minutes. Cross-analysis by education, gender and occupation

		Mean	Median	Std Deviation
Age	Up to 27 (Base 28)	6.28	4.00	5.96
	28-37 (Base 28)	3.63	2.25	4.07
	38 and more (Base 20)r	6.19	3.00	8.01
Gender	Male (Base 49)	5.00	3.00	5.68
	Female (Base 27)	5.45	3.00	6.23
Experience with the medium	Low experience (Base 26)	5.34	3.00	5.76
	Medium experience (Base 29)	4.43	3.00	5.89
	High experience (Base 21)	5.80	3.50	6.02
Education	Low (Base 12)	7.09	5.00	6.67
	Medium (Base 35)	6.12	3.00	6.98
	High (Base 29)	2.91	2.00	1.98
Occupation	Work (Base 51)	4.04	3.00	3.95
	Study (21)	6.11	3.00	6.43

The SMS communication content included both coordinative issues and “playful” themes useful for the strengthening of social ties (Table 3). The most frequent SMS topics concerned the maintenance of sociability through love/friendship messages; greetings and congratulations; jokes; unidirectional messages (40% of answers); the spatial-temporal synchronization of communicators (37% of responses); and task coordination (16% of answers). An important advantage of SMS for the construction of the communication content is that this offers more privacy through a non-intrusive contact initiation than verbal telephony, which can drop into completely unpredictable environments where unwelcome third parties may be present (Geser 2003). Its almost encrypted content and the manner of reading contrast with all other forms of writing (e.g. letters), which can easily be intercepted by intermediaries (Ling/Yttri 1999, quoted by Geser, 2003).

Table 5. Issues in SMS communication. Answers to the open-ended question: What are the most frequent topics when communicating over SMS?

Dimensions		Pct of responses (Base 88)	Cumulated Pct. of responses	Pct of cases (Base 76)	Cumulated Pct of cases
Sociability	Maintenance of social ties (love, sex, friendship)	33	33	55	55
Spatial-temporal coordination	Appointments (combined time and place references)	8	70	13	116
	Time references only	23		38	
	Spatial clues only	6		10	
Task coordination	Problem solving, information	16	86	26	142
Unidirectional	Jokes	5	91	7	149
	Other unidirectional messages	2	93	4	153
Other	Other	7	100	13.0	166*

Note: *Sum of pct. over 100 due to the multiple answers

These results prove that mobile communication is indeed distinctive. Between users who can move while pursuing communication, a sort of mental communication “room” is constituted.

The communication intent and its assumed effects are the main factors underlying this construction. If the communication goal, and, therefore, the effect of communication on the receiver, is the reciprocal harmonization of the daily agenda, the content serves to regulate mobility, navigation in the physical space, and temporal synchronization. If the communication is targeted to the maintenance of sociability, the physical space with its temporal coordinates is quasi-ignored, the “mobile communication room” turning into a frame for social conversation. The mobile communication structure is also versatile and unstable because communicators may very easily switch from navigation-related contents to chatting and vice-versa. Not only does this versatility come from communication purposes, but it also derives from the mobility of the communicators in the physical space, which leads to a strong fragmentation of viewpoints and experiences: one should flexibly react to various problems occurring in ever-changing contexts.

4.3.2.2. Re-building of the Situational Field

Mobile communication structure has been constituted not only as a result of wireless technology usage, but also in interaction with the usage and perception of other concurrent or complementary structures. To investigate this issue, the empirical study includes a comparative section in which respondents, both users and non-users of cell phones, were asked to judge the suitability of face-to-face communication, the telephone conversation, mobile phone dialogue, SMS, and e-mail on the Internet for 23 statements defining social/entertaining conversation; coordinative/instrumental communication; reassurance/risk decreasing; commercial communication; and transmission of short information. In this way, the construction of mobile communication in the *dispositif* is further explored, with emphasis being placed on the interaction between the mobile telephony *dispositif* and the competing communication *dispositives*

The comparative nature of the task improves the validity of the assessment, because respondents had to perform a double operation: to consider their subjective experience of wireless telephony and to compare it with their usage and perception of other communication technologies or forms. Consequently, the results about voice mobile telephony and SMS in the graphs below are to be interpreted as relative ones.

As mentioned before, several situations included in the study are related to the pleasure to communicate with others and to build or maintain social contacts. The statement, *Lust zu kommunizieren (desire/appetite to communicate)*, defines the communication driven by external or internal impulses to socialize and to transmit impressions or emotions to a trusted fellow (see the left graph on the next page). Approximately one third of the answers (29% user responses, 33% non-user responses) indicated that face-to-face contact was the most appropriate for this circumstance. Almost one fifth of user answers went in favor of the Internet chat. An important part of non-user responses (21%) pointed that e-mail on the Internet could be used out of the impulse to communicate with somebody. The difference between mobile users’ and non-users’ assessments on this aspect was statistically significant. Less than 10% of user answers mentioned mobile verbal communication and SMS for this item. This could be an additional sign that *mobile communication* may be not so “communicative” as its name indicates, serving rather different purposes.

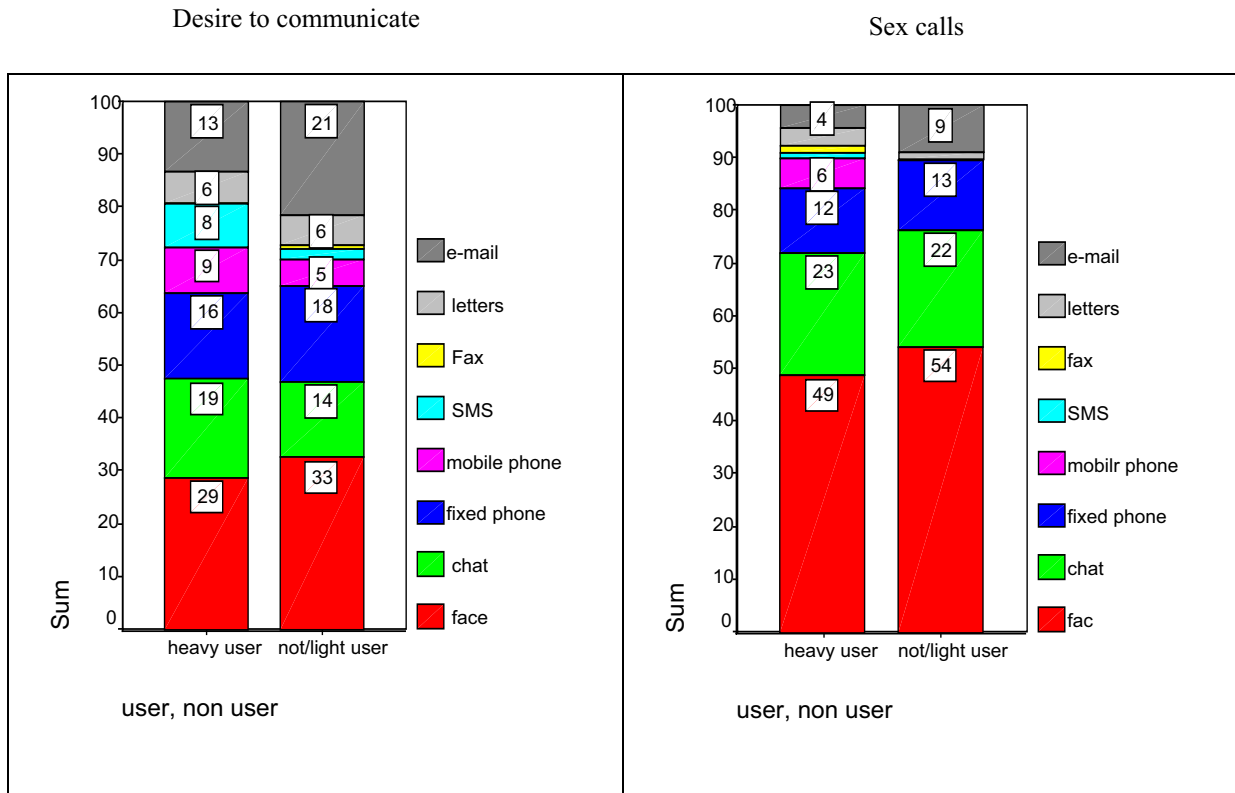


Figure 1. Percents of mentions (ticks in the questionnaire) for the eight studied communication forms. The left graph shows the result for “Desire to communicate (*Lust zu kommunizieren*) and the right graph the results for the “Sex calls”.

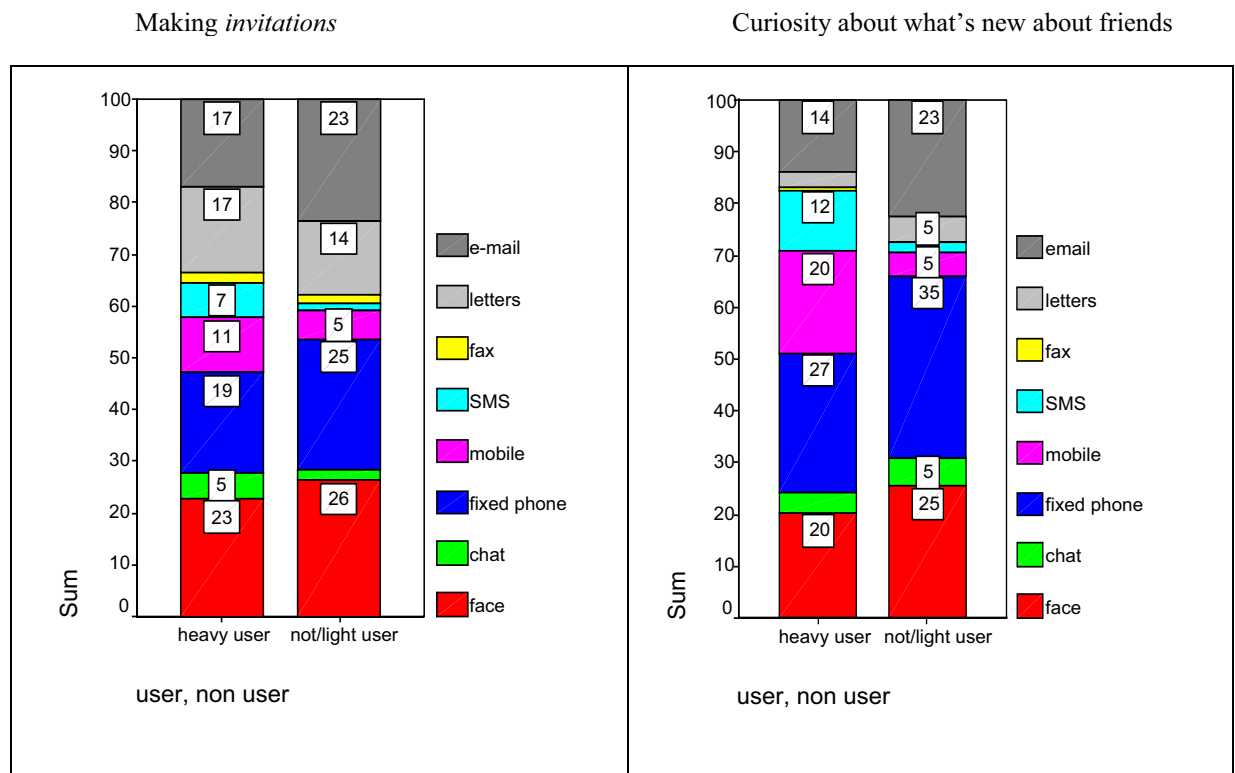


Figure 2. Percent of mentions (ticks in the questionnaire) for the eight studied communication forms. The left graph shows the result for Making invitations (*Einladungen aussprechen*) and the right graph, the results for the “Curiosity about what’s new about friends” (*Wenn man neugierig ist, wie es seinen Freunden geht*)

Making invitations represents an important dimension of social communication. Invitations can be formulated, revised and carried out on various channels according to the degree of formality required and the development of media. In our time, as the survey revealed, although letters and face-to-face contact preserved their importance, the growing preference of the communicators to make invitations over e-mail and the telephone could be highlighted. Differences between mobile users and non-users appeared with respect to the Internet chat, e-mail, mobile and SMS, in the sense that non-users tended to prefer the e-mail more, while users considered mobile verbal communication, SMS and the Internet chat more suitable to make invitations than non-users (see Figure 2, the left graph).

In the right graph of Figure 2, non-users considered the fixed phone the most appropriate medium to find out what’s new about friends. Although many users of mobile phones recognized the suitability of the fixed phone for this task, too, over one third of their responses went in favor of the mobile forms (verbal + SMS). Significant differences between users and non-users occurred concerning mobile conversation and SMS.

It should be recognized that good news stimulates communication, bringing pleasure and sometimes leading to continuation and feedback. In a generally balanced picture of all media, important differences between users and non-users appeared concerning the perception of the suitability of the e-mail, letters, SMS, and mobile conversation for the communication of good news (Figure 3, the left graph). In the right graph, results about the transmission of bad news are presented. Because bad news sometimes requires further clarifications and reassurance, this can generate an even greater communication need, thus leading to longer conversations than good news. Consequently, both users and non-users saw face-to-face contact as particularly suitable for this situation, followed by the fixed telephone and the e-mail on the Internet. More non-users than users considered the fixed phone appropriate for this task.

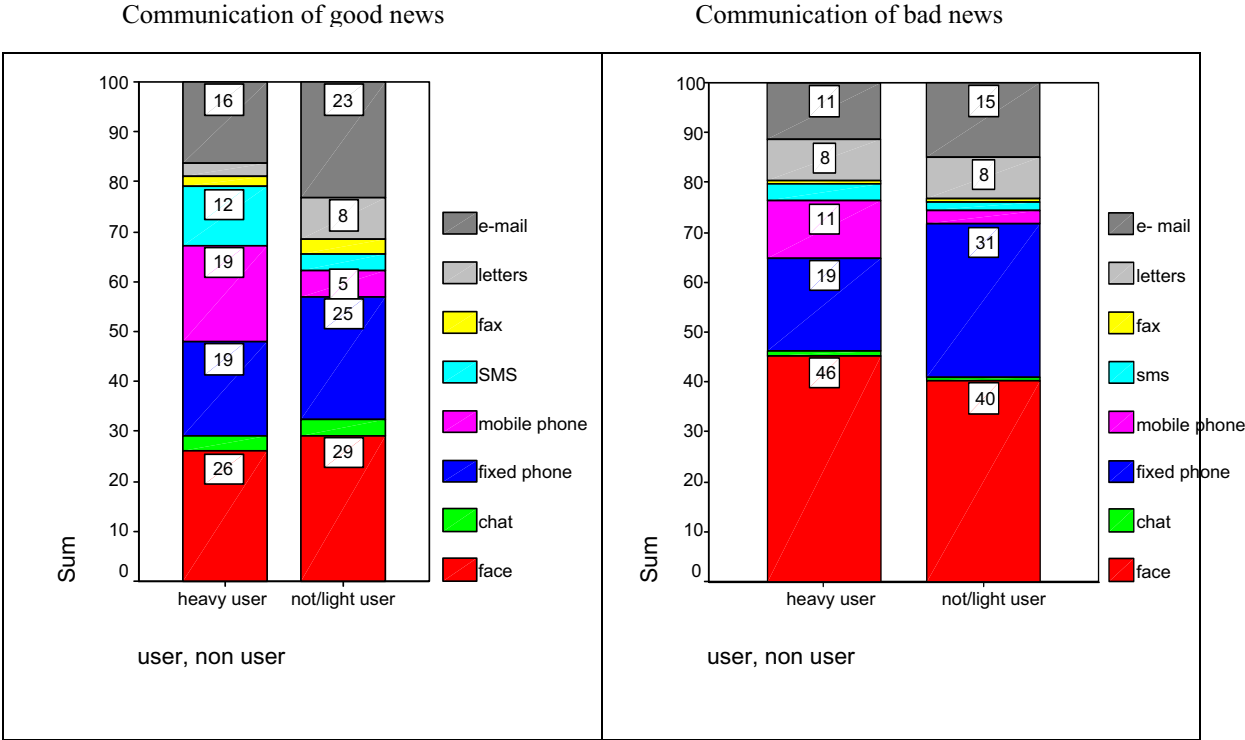


Figure 3. Percents of mentions (ticks in the questionnaire) for the eight studied communication forms. The left graph shows the result for Communication of good news (*eine gute Nachricht mitteilen*) and the right graph the results for the “Communication of bad news” (*schlechte Nachricht mitteilen*)

Differences between users and non-users also appeared concerning the playful dimension of communication (Figure 4, the left graph).

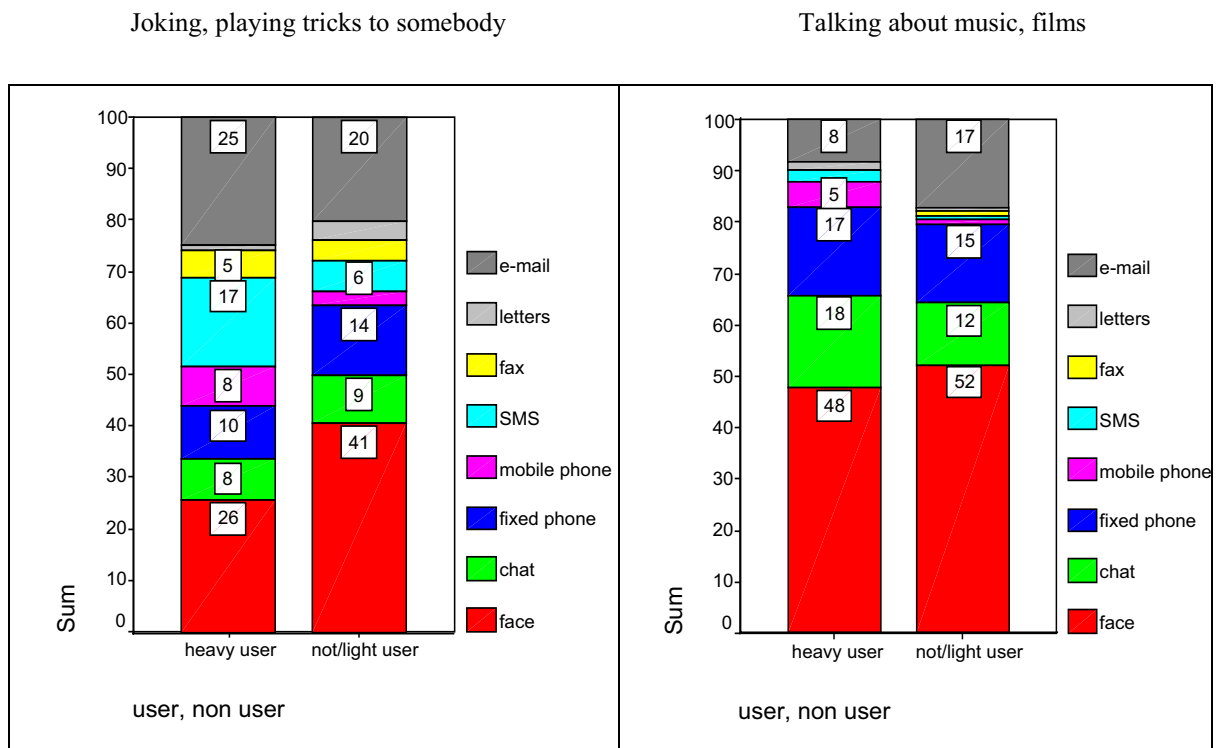


Figure 4. Percents of mentions (ticks in the questionnaire) for the eight studied communication forms. The left graph shows the result for “Playing tricks to somebody” (*jmd. einen Streich spielen, Witze machen*) and the right graph the results for the “Talking about movies, musik” (*über Filme, Musik unterhalten*)

Significantly more non-users than users thought that jokes and tricks were characteristic for face-to-face contacts. Conversely, mobile users emphasized the suitability of SMS for playing tricks. In the right graph of Figure 4, the face-to-face contact, chatting on the Internet and the fixed phone emerged as main carriers of lengthier conversations about various entertainment issues (*über Musik, Filme unterhalten*). Differences between users and non-users occurred in the assessment of the suitability of the e-mail and mobile verbal conversation for this task: generally, the non-users preferred the e-mail, while many user responses favored the mobile verbal communication.

The findings also revealed a shift that mobile usage produced in the perception of media suitability for romantic/love contacts (See Figure 5, the left graph: *Talking about love, flirting*). While more than a half of non-user responses (51%) highlighted the suitability of face-to-face communication for this action, the percentage dropped to 37% in the case of mobile users, who tended to employ a broader variety of means to transmit their love messages. More mobile users than non-users mentioned the chat, mobile conversation, and SMS for this communicative act. In the right graph, face-to-face contacts and the fixed phone were considered the most suitable media for making excuses. Significant differences between users and non-users appeared regarding mobile conversation and SMS.

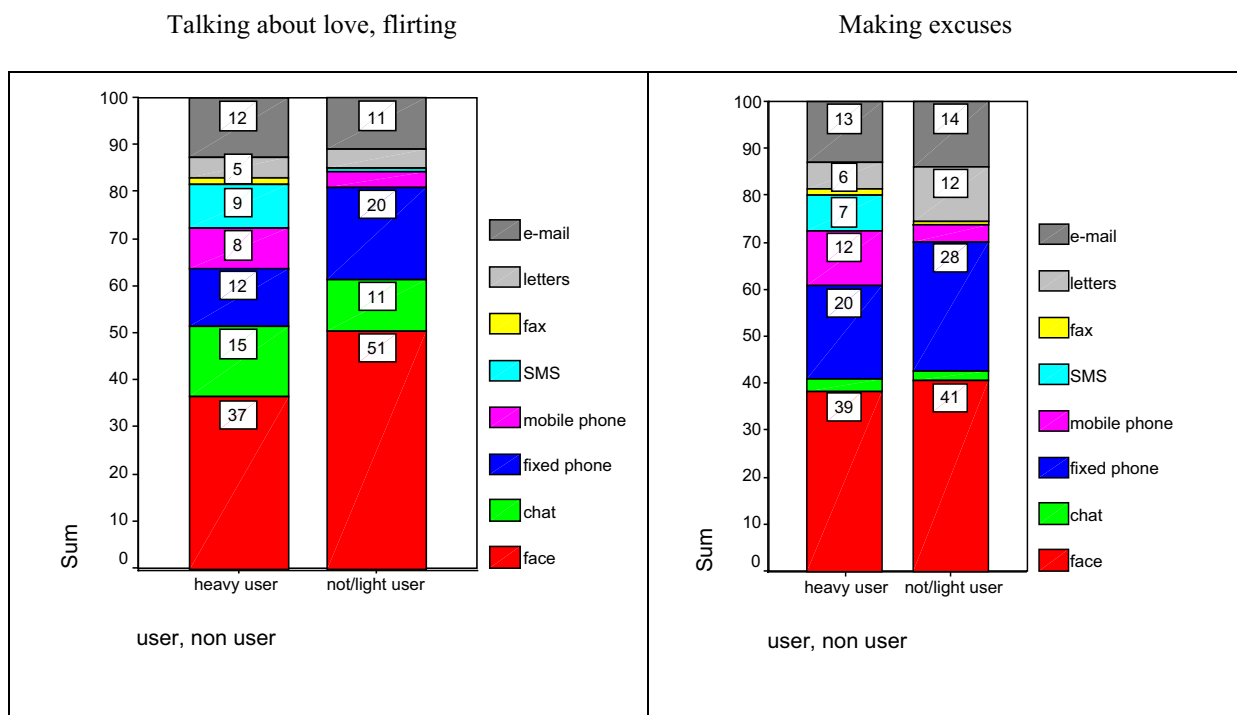


Figure 5. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the result for “Talking about love, flirting” (über Liebe sprechen/Flirten) and the right graph the results for the “Making excuses” (sich entschuldigen)

Although different from the aforementioned communicative actions of social talk, solving a work problem (Figure 6) generally requires a lengthy communication, an exchange of information and expertise, which sometimes surpasses the capability of the temporally restricted media. Therefore, the face-to-face contact, the telephone and the e-mail emerged as preferred channels for professional communication. Although evaluations of users and non-users were rather similar, a significantly higher number of user responses favored the mobile verbal communication for the fulfillment of this task.

Solving a specific work problem

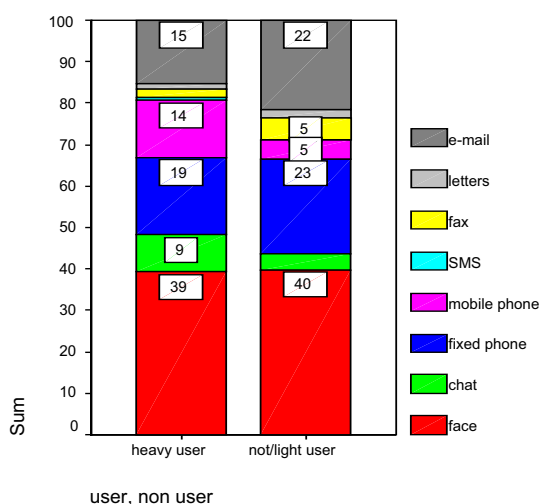


Figure 6. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The graph shows the results for “Solving a specific work problem” (konkretes Arbeitsproblem lösen)

Several statements used in the study described **short communication tasks** with sociable poten

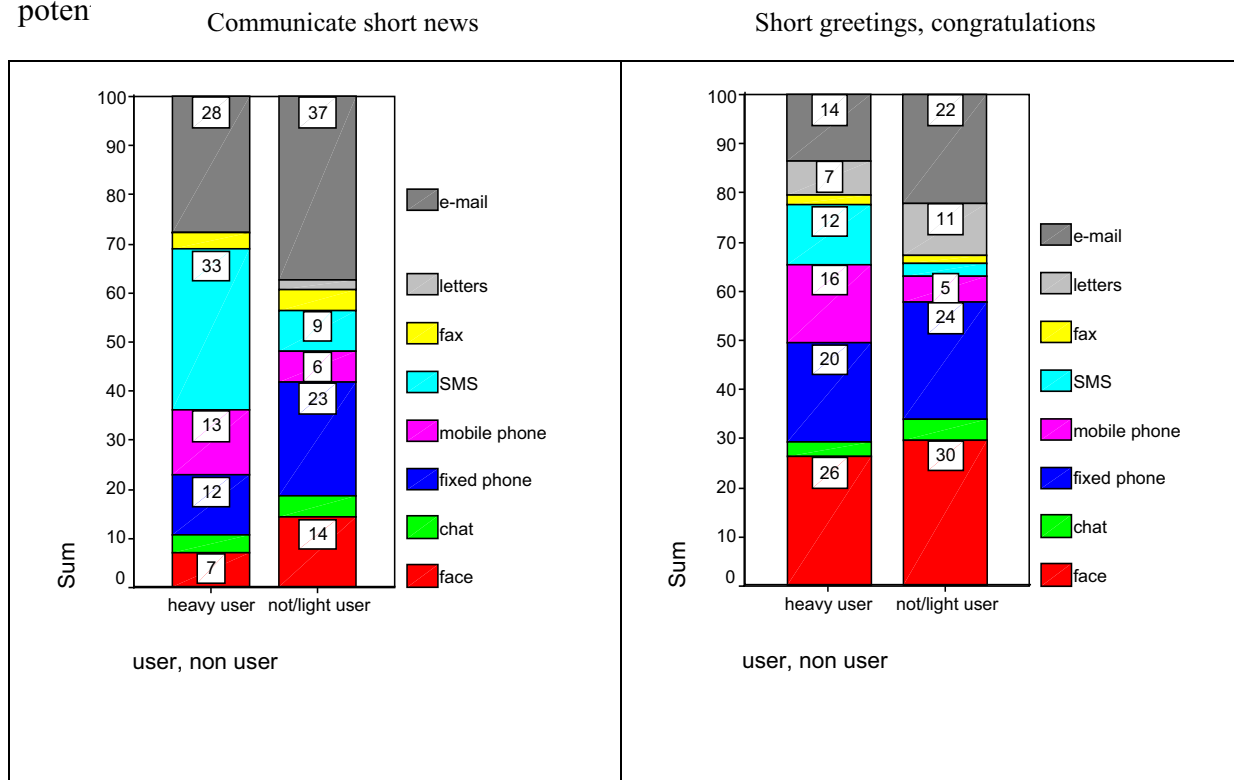


Figure 7. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the results for “Communicate short news” (kurze Nachrichten mitteilen), and the right graph the results for “Short greetings, congratulations” (jemandem kurz begrüßen/gratulieren)

Mobile users believed that sending short messages was particularly suitable for SMS communication (Figure 7, the left graph). Nevertheless, non-users failed to recognize this potential of SMS and mentioned, most frequently, the e-mail. In the right graph, greetings and congratulations as important social communicative tasks exhibited a rather balanced preference pattern. Users’ mentions were almost equally spread among face-to-face, the fixed phone, the e-mail, the mobile communication and SMS. Differences between users and non-users concerning mobile conversation; SMS; and e-mail on the Internet have been identified.

Other statements relate to the coordination of the daily agenda and risk management (Figure 8). In particular, checking to see if everything is all right or if something new has happened (*Erkundigung, ob alles in Ordnung ist bzw. ob es etwas neues gibt*) helps the subject to efficiently pursue his daily program and control daily events. As presented in the left graph on the next page, non-users generally indicated the fixed phone and the e-mail as appropriate for this task. Nevertheless, for mobile phone users, fixed and mobile phone conversation ranked at the top. Differences occurred between users and non-users concerning the suitability of the e-mail; fixed phone; mobile and SMS for this short reassuring action. Reassurance is also very important in distress situations, which require specific media. The right graph describes the assessment of the suitability of the studied media for emergency calls (*Polizei oder Krankenhaus im Notfall kontaktieren*). As showed in Figure 8, this task can best be accomplished by the fixed and mobile phone conversation, with differences between users’ and non-users’ assessments.

Anxious to know if everything is all right

Contact police or hospital in emergency situations

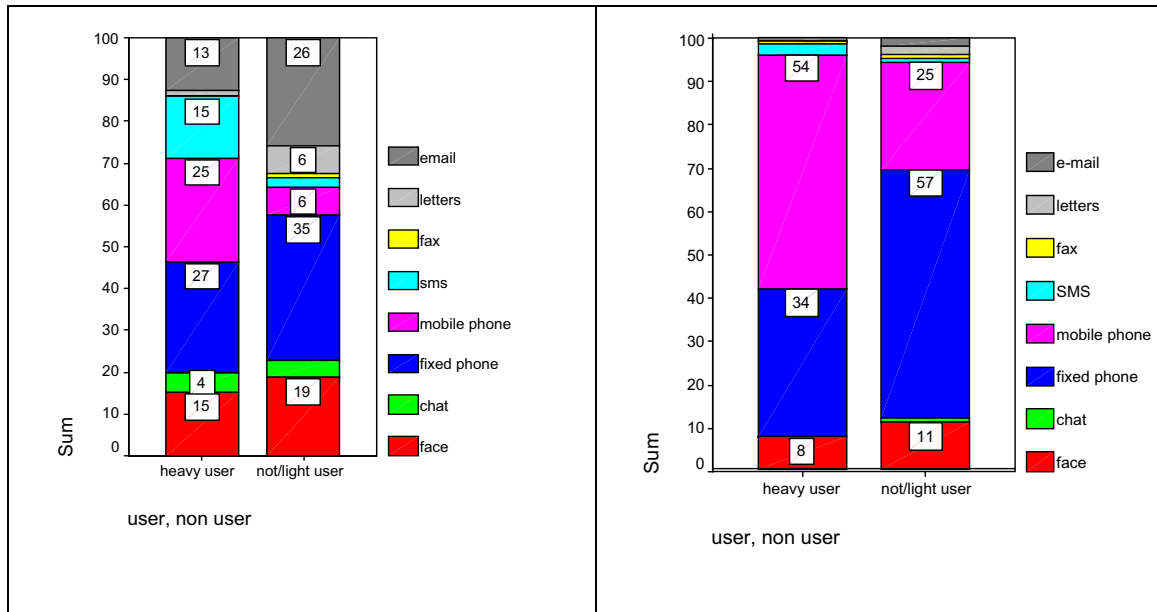


Figure 8. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the result for “Anxious to know if everything is all right” (Erkundigung, ob alles in Ordnung ist bzw. ob es etwas neues gibt) and the right graph the results for the “contact police or hospital in emergency situations” (Polizei oder Krankenhaus im Notfall kontaktieren)

Scheduling appointments is a form of coordination of social interaction and convention based primarily on reciprocity (Kim, 2002). Appointment reciprocity assumes mutual respect for one another's time and relationships. As presented in the left graph of Figure 9, the string phone, the e-mail, and the mobile phone conversation were considered the most suitable for making appointments.

Making appointments

Canceling appointments

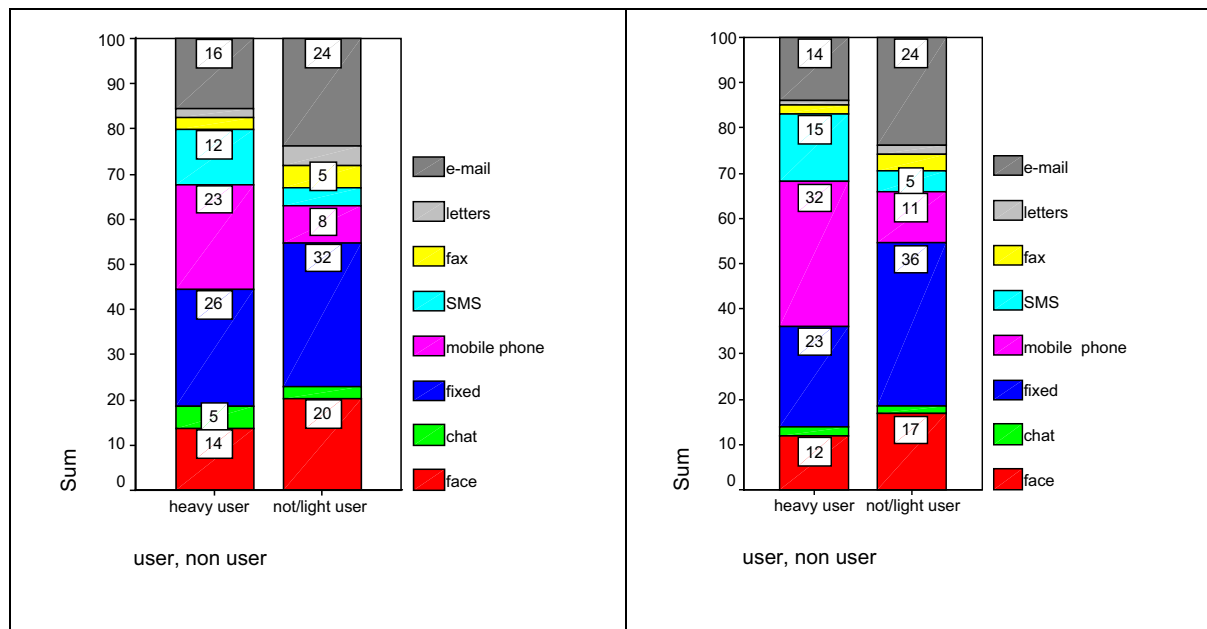


Figure 9. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the results for “Making schedules” (Termine/Verabredungen vereinbaren) and the right graph the results for the “Canceling appointments” (Termine/Verabredungen absagen)

Significant differences between user and non-user groups occurred concerning mobile conversation, SMS, and e-mail. The assessment of media suitability for cancellation of an appointment exhibits an almost similar pattern. Significant differences occurred between users' and non-users' opinions about the fixed phone, mobile conversation, SMS, the e-mail. More users than non-users mentioned mobile conversation and SMS as appropriate for the cancellation of an appointment, while e-mail and the fixed phone were more selected particularly by non-users.

Keeping in touch with family while distant travel relates to the reassurance dimension of the daily coordination. As presented in the left graph of Figure 10, for non-users, particularly the fixed and mobile phone conversation, and the e-mail, provided reassurance while on the way. Conversely, users believed that the usage of mobile telephony and SMS is particularly reassuring while traveling. Statistically significant differences between users and non-users were found for the e-mail, mobile phone, and SMS variables. The right graph refers to the communicative actions involved in travel management. The results emphasized the important role of the e-mail and fixed phone conversation for non-users in the mobility management. On the contrary, the users of mobile phones felt less confident with the e-mail and reinforced instead the utility of the mobile verbal conversation for travel planning. Statistically significant differences between users and non-users appeared in the assessment of the suitability of mobile conversation and the e-mail for travel organization.

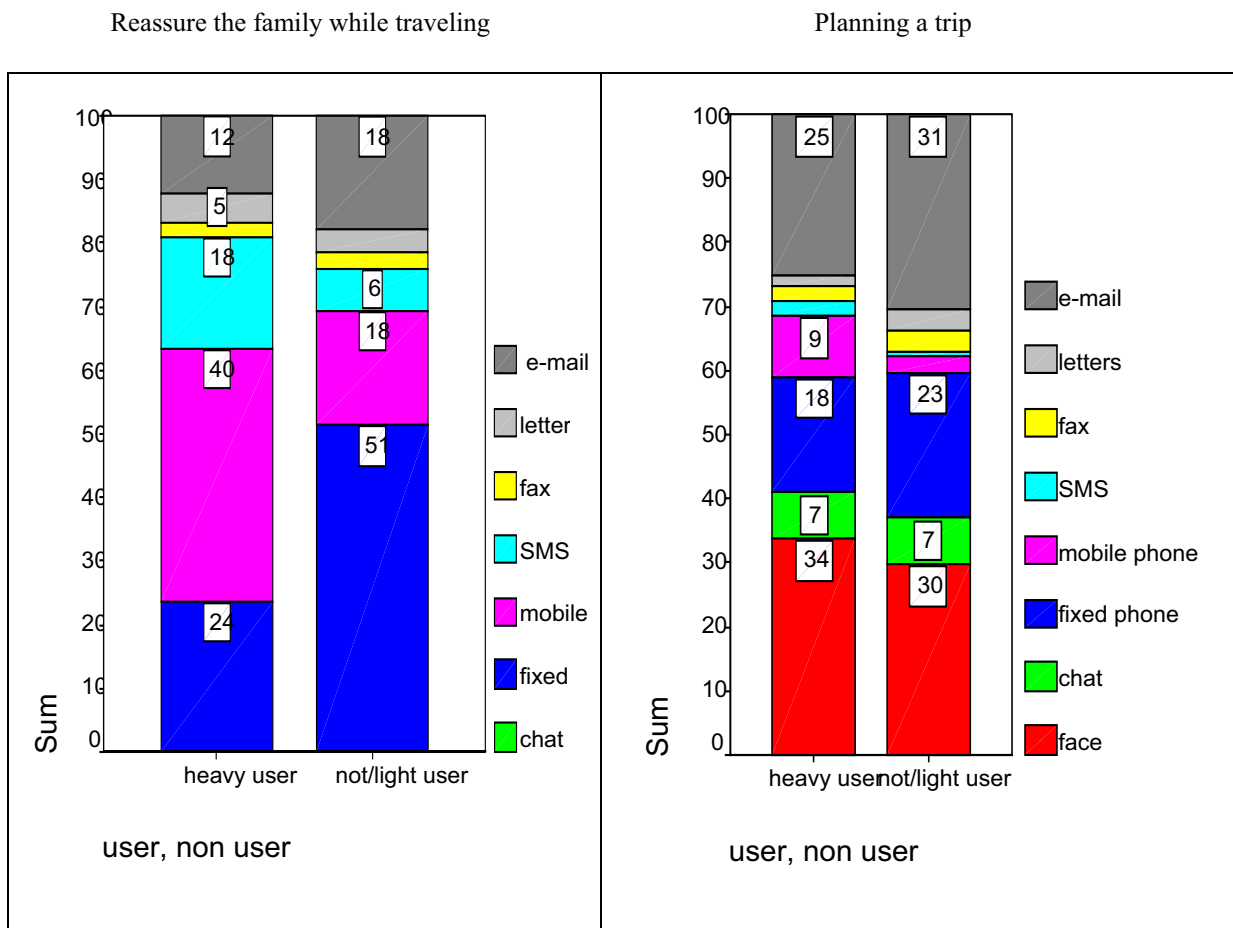


Figure 10. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the results for “Reassure the family while traveling” (Wenn man reist bzw. unterwegs ist und die besorgte Familie beruhigen möchte), and the right graph the results for the “Planning a trip” (Eine Fahrt, Reise planen)

Other three items relate to the commercial dimension of the mobile telephony usage: financial advice, communication carried while online purchasing or pre-buying (booking), and in the collection of information about products (See Figures 11 and 12).

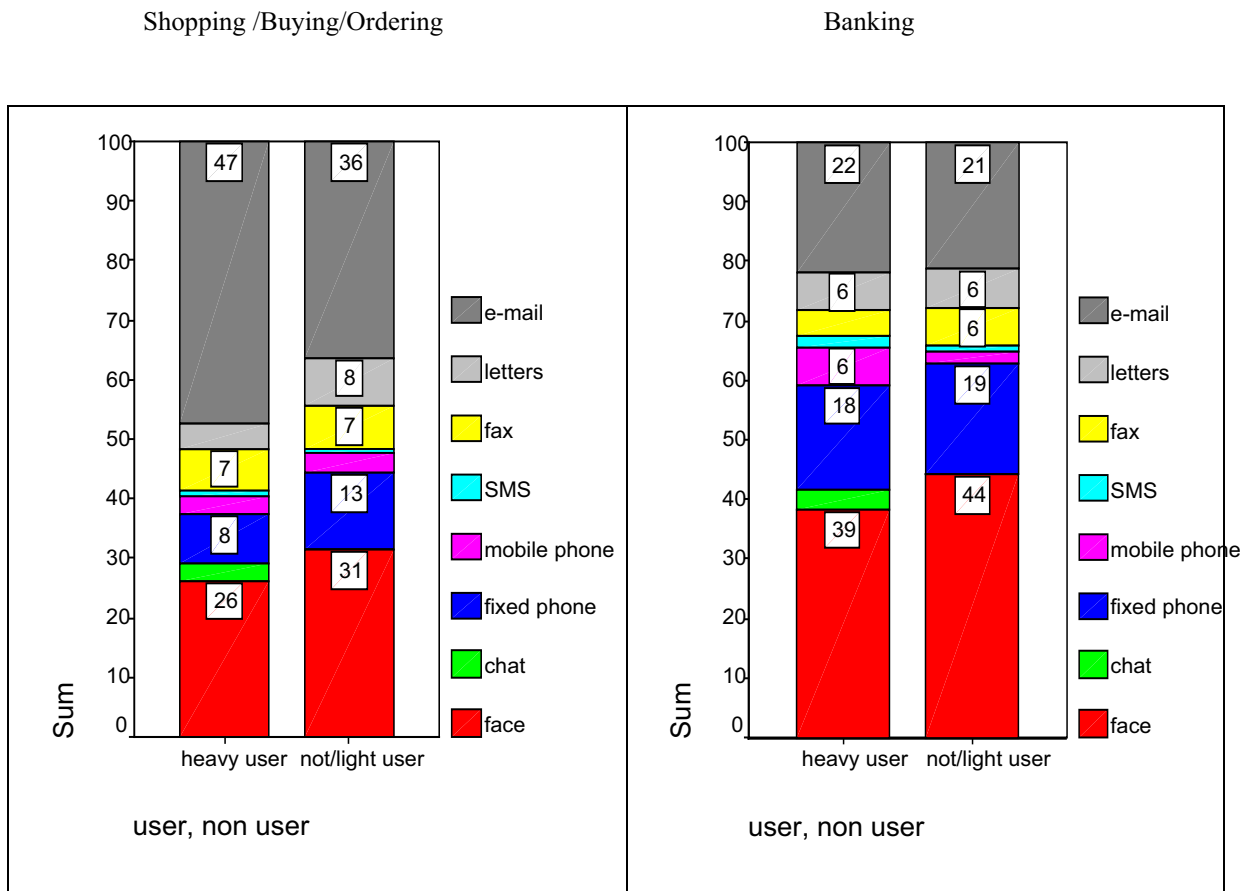


Figure 11. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the results for “Shopping” (Einkaufen/Online Bestellung/Bestellung), and the right graph the results for the “Banking” (Bankdienste/ Finanzberatung)

Although not strictly communicative, mobile commerce deserves a more detailed investigation because of its growing potential forecasted by some experts. In the current study, for both users and non-users, the most appropriate medium for online purchasing and pre-buying actions (booking, reservations) was e-mail on the Internet. However, 13% of user responses mentioned mobile telephony as suitable for booking and reservations. Finally, the collection of information about products as a communicative action preceding the purchasing act proved to be mainly carried over the e-mail on the Internet. More non-users than users mentioned this medium.

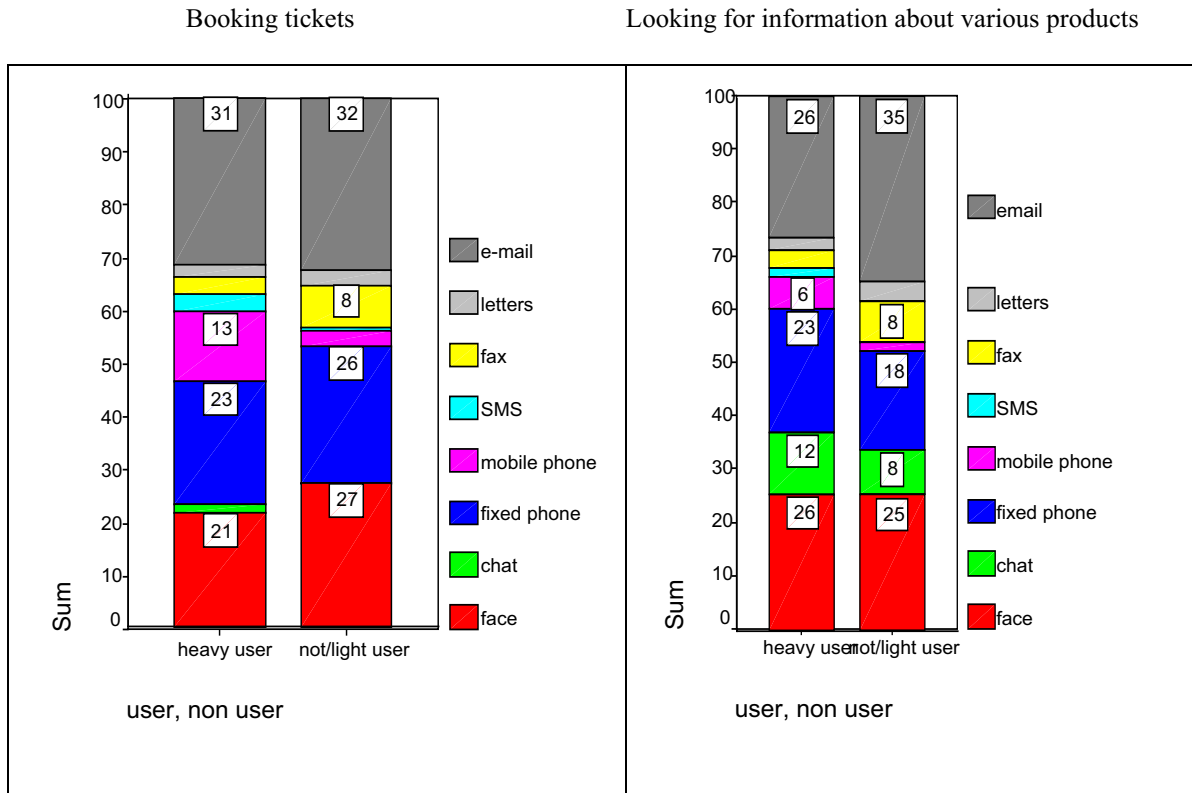


Figure 12. Percents of mentions (ticks in the questionnaire) of the eight studied communication forms. The left graph shows the results for “Booking tickets” (Kartenvorverkauf: Fahrkarten, Eintrittskarten), and the right graph the results for “Looking for information about various products” (sich erkundigen nach verschiedenen Produkten)

From this part, it can be concluded that, overall, perceptions were consistent with the previous conclusions in the content section. It came out that mobile users better discriminated among the suitability of various media in specific situations. While for both users and non-users, face-to-face communication strongly associated with sociability and was driven by the appetite to communicate, mobile and string phone conversation and the SMS enjoyed a distinct positioning in the situational field. In particular, mobile users attributed to the mobile phone a strong coordinative value (coordination of the daily agenda, risk management, and instant problem solving) on a background of a rather insufficient talkative potential. On the contrary, non-users generally failed to acknowledge the coordinative dimension of the mobile phone. They, nonetheless, better observed its “poorly communicative” character. SMS positioned higher for users than for non-users on the coordinative dimension and proved to be particularly appropriate for short contact occasions. The fixed phone was for both users and non-users merely coordinative, with a slight advantage for non-users. E-mail occupied a rather comfortable position as being considered reasonably informative, comprehensive, coordinative and particularly appropriate for commercial and professional information exchange.

This section has already given some hints about how perceptions of the usage of other media and forms (like the e-mail, letters and the string phone) interacted with mobile usage in specific communicative situations. Cross-tabulations of the perceptions of these media with the **mobile usage** variable produced further output. Table 1 summarizes the asymptotic significances (2-sided) of Pearson chi-square for the relevant associations.

Table 1. General interactions between assessments of the suitability of the various media in various communicative situations with mobile usage variable.

	Face-to-face	Internet chat	Verbal telephony	Voice mobile telephony	SMS	Fax	Letters	E-mail (Computer
Desire/impulse to communicate	-	-	-	-	0.006	-	-	0.010
Sex Calls	-	-	-	-	-	-	-	-
Anxious to know if everything is OK	-	-	0.006	0.000	0.000	-	0.010	0.000
Canceling appointments	-	-	0.000	0.000	0.000	-	-	0.012
Making appointments	-	-	-	0.000	0.001	-	-	0.048
Banking/Financial counseling	-	-	-	-	-	-	-	-
Making invitations	-	0.043	-	0.029	0.003	-	-	0.049
Solving a work problem	-	-	-	0.004	-	-	-	-
Communicating short information	0.024	-	0.001	0.047	0.000	-	-	0.001
Sending bad news	-	-	0.053	0.009	-	-	-	-
Booking tickets				0.002				
Playing tricks, making jokes	0.006				0.004			
Talking about films, music				0.053				0.040
Asking for information about various products								0.043
Talking about love/flirting		0.046		0.017	0.000			
Police or hospital calling in emergency			0.003	0.000				
Apologizing				0.000	0.000			
Curiosity about what's new about friends	-	-	0.000	0.000	0.001	-	-	-
Reassuring the worried family while travelling	-	-	-	-	-	-	-	-
Buying/Online reservation/Booking	-	-	-	0.000	0.000	-	-	0.028
Greeting/Congratulating	-	-	-	0.000	0.001	-	0.011	0.046
Sending good news	-	-	-	0.025	-	-	-	0.031
Planning a trip								

Note: Each cell indicates the result of cross-tabs (Pearson chi-square test) between the dichotomous variables (mentioned/not mentioned) and mobile usage variable (user/non user). Asymptotic significances (2-sided) of Pearson Chi-Square are shown for the significant differences only.

However, what could these general associations tell about the influence of other media perceptions on mobile telephony usage? To answer these questions, I considered mobile telephony usage the dependent variable in the cross-tabulations before. A measure of association called Lambda was employed to show the proportional reduction in error when values of the independent variable were used to predict values of the dependent variable. A value of 1 means that the independent variable perfectly predicts the dependent variable. A value of 0 means that the independent variable is of no help in predicting the dependent variable. Table 2 below shows the values of Lambda for the significant associations only. It

can be noticed that the communicative action of making and canceling appointments over the mobile phone, mobile verbal communication of good news, the verbal reassuring of the family while traveling, the usage of voice mobile telephony in emergency situations and transmission of short messages over SMS have the highest explanatory power for mobile usage.

Table 2. Lambda values for the significantly associated variables.

	Face-to-face	Internet chat	Verbal telephony	Voice mobile telephony	SMS	Fax	Letters	E-mail (Computer)
Desire/impulse to communicate	-	-	-	-	0.149**	-	-	
Sex Calls	-							
Anxious to know if everything is OK	-		0.205*	0.384**	0.260**			0.292*
Canceling appointments	-		0.292**	0.472**	0.250**			
Making appointments	-			0.431**	0.222**			
Banking/Financial counseling	-							
Making invitations	-			0.141°	0.155**			
Solving a work problem	-			0.181*				
Communicating short information			0.250°		0.452**			0.260**
Sending bad news				0.139*				
Booking tickets				0.174**				
Playing tricks, making jokes					0.188*			
Talking about films, music								0.141°
Asking for information about various products								
Talking about love/flirting				0.129*	0.200**			
Police or hospital calling in emergency			0.225*	0.514**				
Apologizing				0.200**	0.171**			
Curiosity about what's new about friends				0.389**				
Reassuring the worried family while travelling	-		0.352**	0.451**	0.225**			
Buying/Online reservation/Booking	-							
Greeting/Congratulating	-			0.319**	0.275**			
Sending good news	-			0.408**	0.229**			
Planning a trip	-			0.116*				

Note ** Lambda highly significant ($p \leq 0.01$)

* Lambda significant ($p \leq 0.05$)

° Lambda slightly significant ($p \leq 0.1$)

How can these results be interpreted in what concerns the other media? If Lambda value is significant, this means that the agreements/disagreements with the statement/per medium help in predicting mobile usage. For instance, in the table below, a higher number of user's disagreements with the special utility of the fixed phone to reassure family while traveling is more likely to predict the usage of mobile phones in this situation and vice-versa.

Table 3. Crosstabulation between the suitability of the fixed phone to reassure the family while traveling and the mobile phone usage.

Reassuring the family			Total
		heavy user	not/light user
The fixed phone	Disagreement	<u>40</u>	15
	Agreement	31	<u>57</u>

The analysis of respondents' perceptions revealed that, from among the competitive media, the perception of the "situational" field of the fixed phone and the e-mail on the Internet brought an important contribution to the explanation of mobile telephony usage. The disagreement with the particular suitability of the fixed phone for some coordinative actions like *canceling of appointments; calling in emergency; reassuring the family or short contact actions* (communicating short news), and of the e-mail on the Internet *to talk about music, films; to ask what's new; and to communicate short information* helps predicting mobile phone usage.

Table 4. Communicative actions featuring interaction between other communication forms and wireless telephony usage.

Affected areas/Communication forms	The e-mail	The string phone conversation
Communicative potential, entertainment	Talking about music, film	
Coordinative potential	Anxious to know if everything is all right	Anxious to know if everything is all right Canceling of appointments Police or hospital calling in emergency Reassuring the family while travelling
Short contact potential	Communicating short information	Communicating short information

Note: Evaluations are subjective perceptions of the suitability of the medium and not assessments of usage frequency

Interesting is that, for some of the aforementioned communicative actions, interactions between usage as dependent variable and assessments of mobile telephony and SMS also occurred (see Table 5). A higher number of **agreements** with the appropriateness of voice mobile telephony and SMS suitability in these situations also predicted wireless telephony usage. This is as if some agreements would "migrate" from classical media to the mobile communication technology. The explorative conclusion I have drawn is that these shifts could represent communicative situational potential that wireless technology absorbed from other media. The absorption is not necessarily a null sum, in the sense that the lost situational potential of string phone conversation or the e-mail is completely gained by mobile conversation and SMS. On the contrary, a creative re-adjustment, which involved many

concurring communication forms, has happened (see Table 5). The “donor” communication forms (mainly the e-mail and the string phone conversation) are not rendered poorer than before. On the contrary, some of them, like the e-mail or instant Internet communication, may succeed in adapting to the concurrence by abandoning some functions and seeking another undisputed situational potential.

Table 5. Re-building of the situational potential of mobile telephony

	Classical telephony	Voice mobile telephony	SMS	E-mail (Computer)
Anxious to know if everything is al right	Disagreement		Agreement	Disagreement
Canceling of appointments	Disagreement		Agreement	
Communicating short information	Disagreement		Agreement	Disagreement
Police or hospital calling in emergency	Disagreement	Agreement		
Reassuring the family while travelling	Disagreement	Agreement	Agreement	

At a higher level of generalization, how can perceptions of other media usage construct the situational field of mobile telephony? An additional Multidimensional Scaling (distances from data) was performed to confirm the existence of the aforementioned shifts and to measure the perceived distances among the situational patterns. For doing this, I had previously constructed a two-mode rectangular matrix. In rows were entered percents of responses in the table from Q 2.15 of the questionnaire. I was particularly interested in plotting together perceptions of users and non-users, in order to see if any relevant differences in the positioning of communication forms in the situational field existed. The bi-dimensional configuration on the next page (n after name indicates the non user rating) confirmed this fact (see Figure 13).

POSITIONING OF COMMUNICATION FORMS IN THE FIELD OF COMMUNICATIVE ACTIONS

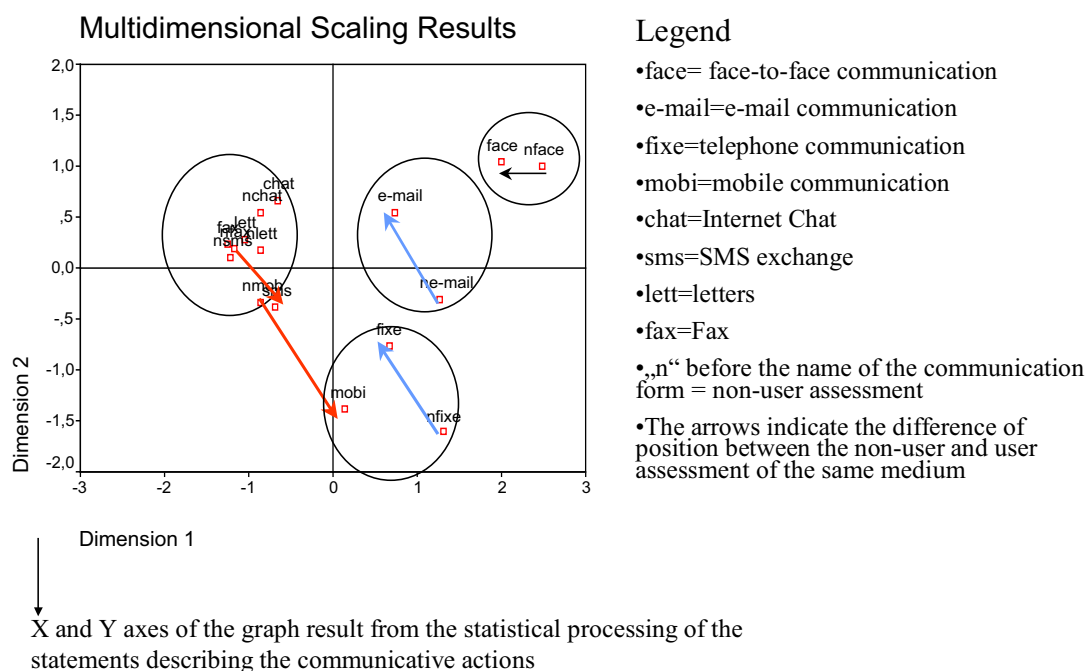


Figure 13. Perception map of communication forms in the bi-dimensional space of communicative actions.

Note: Stress=0.06419, RSQ=0.98534

The graph in Figure 13 can be interpreted as a perception map that shows the relative positions of various communication media or forms in the field of communicative actions. Both positions and distances among media are meaningful. The circles represent clusters of media sharing similar perceptions. With respect to the distances between media, mobile conversation was perceived as the farthest from face-to-face communication and the closest to SMS. Users saw mobile verbal communication more distanced from face-to-face communication than non-users did. Non-users perceived the SMS communicative potential closer to fax, letters, and the e-mail than users did.

I was particularly interested in plotting together perceptions of users and non-users⁸⁵, to see if technology usage had an impact on the assessments. The arrows running from non-user to user positioning signal shifts produced by mobile telephony usage in the perception of a given medium. In the graph above, five arrows could be drawn, confirming the influence of mobile technology usage on the communicative potential of mobile conversation, fixed telephony, SMS, the e-mail, and face-to-face communication. It is not surprising that mobile telephony usage leads to the constitution of an own communication structure, either verbal or written. Interesting is the fact that the usage also structured the entire perceptive field of other communication media and forms. After using wireless telephony, users changed their ways of perceiving the communicative and information potential of other media and even reevaluated some communicative purposes of face-to-face communication.

⁸⁵ In the graph, the character “n” placed before the name of the communication form indicates the non-user assessment.

Several clusters⁸⁶ can be identified: one including users' and non-users' perceptions of face to face conversation; the second containing both users and non users perceptions of the e-mail; the third comprising users' perceptions of string and mobile conversation together with non users perceptions of fixed phone conversations; the fourth containing users' perceptions of SMS; and finally a fifth cluster including a confuse mixing of non-user perception of mobile conversation together with other script media: letters, chat, SMS (non users). As cluster analysis has revealed, face-to-face communication emerged as distinct and far from any other communication form. With usage, mobile verbal conversation even managed to escape from the amalgamated perception of the electronic media cluster and to gain its own clear positioning. SMS communication also slightly differentiated from the other electronic media of written communication and built alone a cluster of mobile written communication.

4.3.2.3. Re-building of the Affective Field - how Mobile Communication is "Felt"/Experienced

The exploration of the affective dimension of mobile communication in the *dispositif* proves to be extremely important, because it goes deep to the base of the experience with the medium in everyday life.

One of the most widely researched emotional issues in the psychology of mobile telephony usage is the reduction of the anxiety, namely the feeling of safety. Several studies confirmed the fact that mobile telephony usage fulfilled safety needs among several specific groups. For example, Rakow and Navaro, 1993, found that women felt safer when driving because of the possession of a mobile phone (Rakow, Navaro, 1993, quoted in Haddon et. al, 2001). The usage of mobile phones generally provides a sense of security and assurance, a peace of mind knowing one has more options to respond (Klamer et al, 2000). The current study has already approached this dimension when exploring the communicative act of reassuring the family while traveling. Mobile telephony and SMS emerged as important tools for reducing anxiety while on-the-way. More than a half of users' responses (56%) indicated that mobile telephony (conversation and SMS together) best fulfilled this need. The same fact was acknowledged by an important percent of non-users (23% of responses) too. Also, the importance of mobile telephony in emergency situations was recognized by the majority of users (54 %) and by an important number of non-users (25% of responses). If gender groups were considered (see the Table 29 in the Appendix), it came out that both male and female users perceived the utility of the mobile in emergency situations more acutely than male and female non-users. Significant differences between users and non-users regarding the reassurance function occurred in the male sub-group, with male users being more aware of this characteristic than male non-users. Results also indicated that young and older users were more aware of the safety potential of the mobile telephony (solving emergency situations) than non-users of the same age category (Table 30 in appendix). Considerably more users than non-users of all ages acknowledged the reassurance function. Analysis across education categories (Table 31, Appendix) revealed that medium and highly educated users recognized the reassurance and safety dimension of mobile telephony usage more than non-users.

In order to better understand the affective dimension of the mobile communication structure, several statements defining various emotional reactions were formulated. The respondents were asked to assess their usual occurrence while communicating face-to-face; over e-mail; telephone; mobile phone; SMS; and letters. A comparative strategy was employed to improve

⁸⁶ Resulted from cluster analysis of the media in the matrix.

the validity of the evaluation process, taking into consideration not only the reactions to wireless technology usage, but also the ones associated with the competitive media. As in the situational analysis from the previous chapter, answers are to be interpreted as relative ones. Users' and non-users' assessments of affective reactions had to consider two settings: one describing the daily informal communication and another related to the formal communication conducted in the work sphere. For comparison purposes, because only users answered the questions about reactions to SMS and mobile telephony usage, the graphs below show bars representing sums of mentions for each medium. For each communication form, the maximum sum for user category is 76, and for the non-user category, 75.

Informal communication

Several statements define pleasant feelings while communicating, like: being in charge of communication; freedom; pleasure (enjoyment); sensation of proximity; and comprehension. The analysis revealed their association with the un-technicised face-to-face communication.

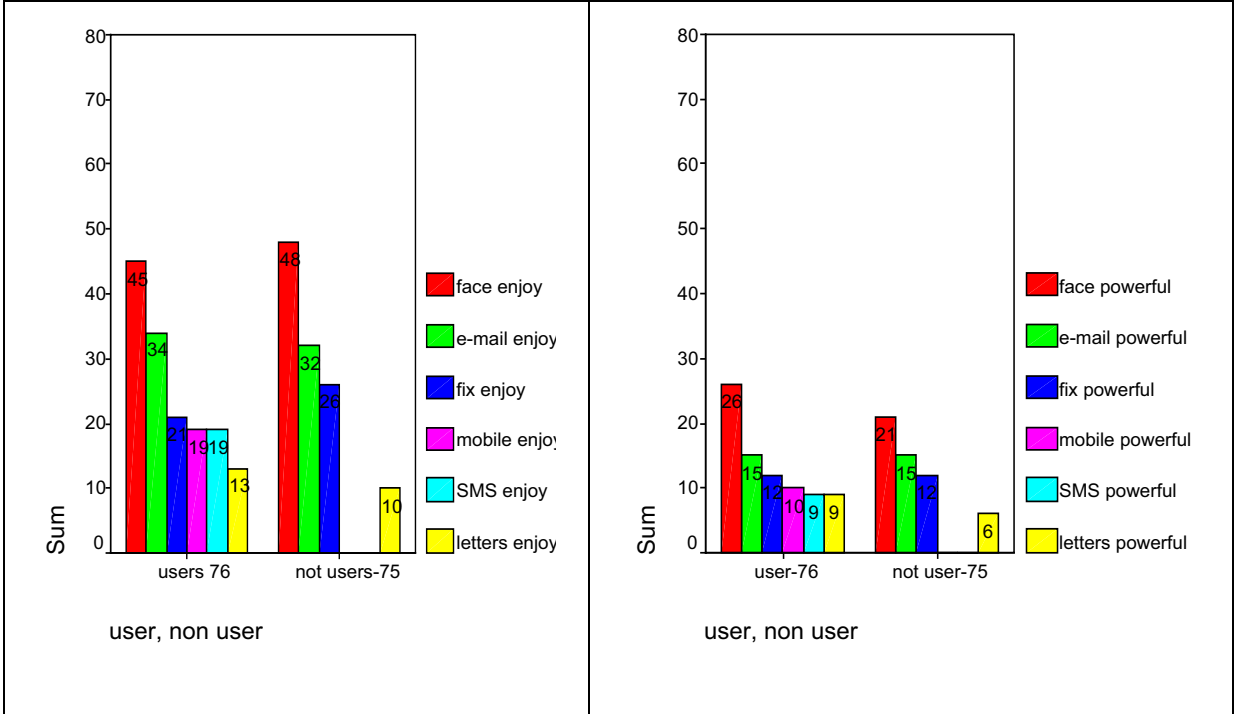


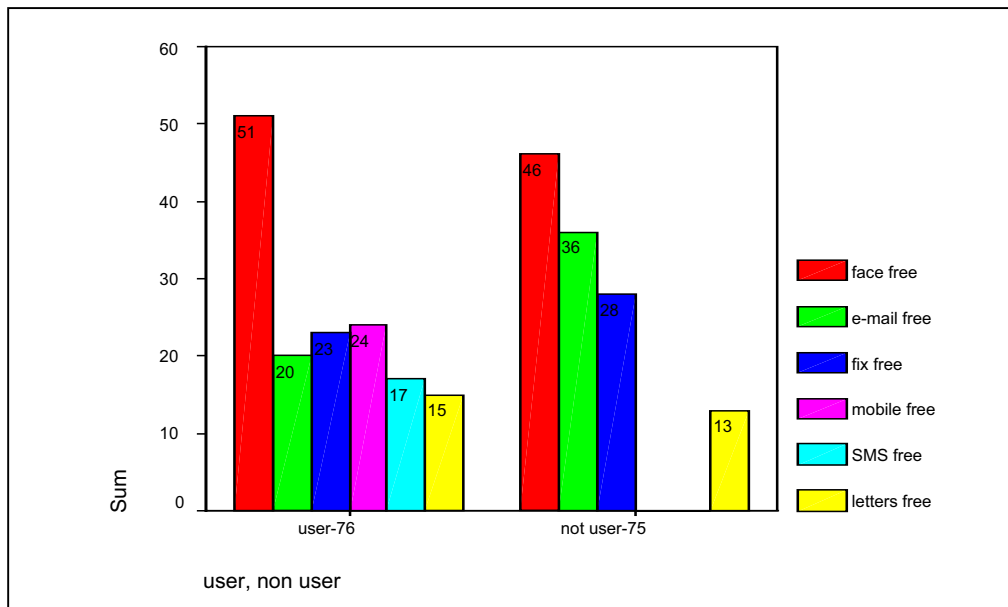
Figure 14. Sum of positive answers to the statement: I really enjoy it (*Macht mir wirklich Spaß*)

Figure 15. Sum of positive answers to the statement: I feel powerful (*Ich fühle mich mächtig*)

In comparison with direct communication and e-mail, mobile telephony and SMS were less associated with enjoyment (Figure 14) and sensation of power (Figure 15). The e-mail appeared to be the most “comfortable” from among the electronic media, because it might exert less temporal and psychic pressure.

Interestingly, mobile conversation performed the second best in terms of communication “openness” - the liberty to communicate and to transmit various thoughts (Figure 16). Important differences appeared between users' and non-users' assessments concerning e-mail usage.

Figure 16. Sum of positive answers to the statement: I feel free to tell anything
(*Ich fühle mich frei, alles zu sagen*)



Face-to-face communication categorically outscored all the other media in terms of content comprehension (Figure 17). However, from among the mediated forms of communication, the telephone and mobile phone conversation enjoyed both a fairly good message understanding.

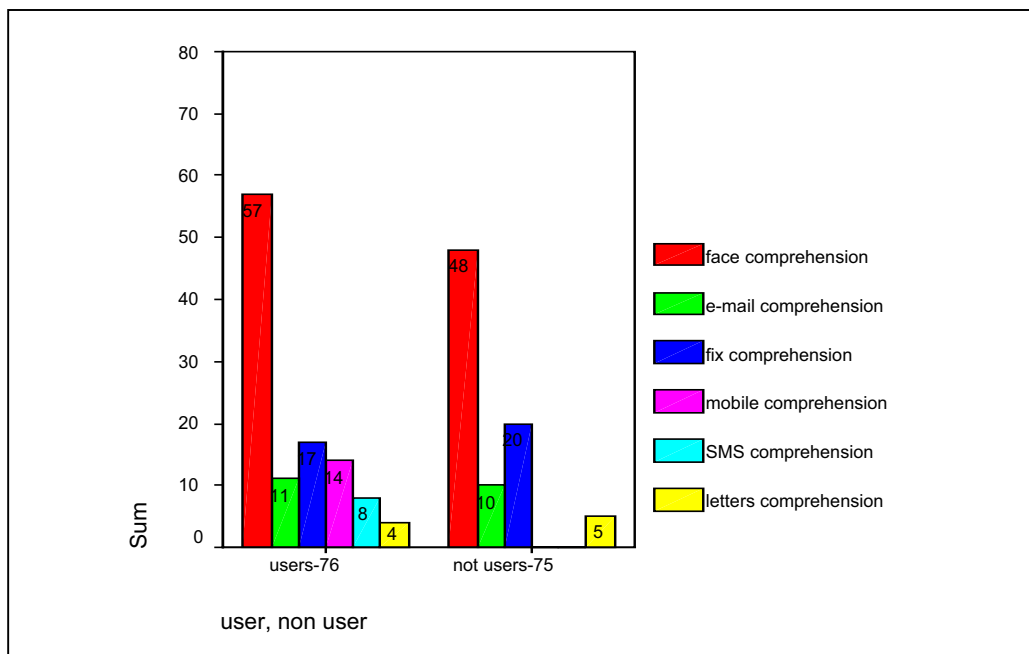


Figure 17. Sum of positive answers to the statement: I fully understand what the partner communicates (*Ich kann den Partner völlig verstehen*)

Also, the sensation of proximity between partners proved to be a key element of direct communication (Figure 18). More than 80% percent of users and non-users singled out this feature as being characteristic for face-to-face contacts. By comparison, all the other media performed poorly on this issue. However, from among the electronic media, 12 % of all mobile users acknowledged that wireless communication rendered the sensation of closeness in communication.

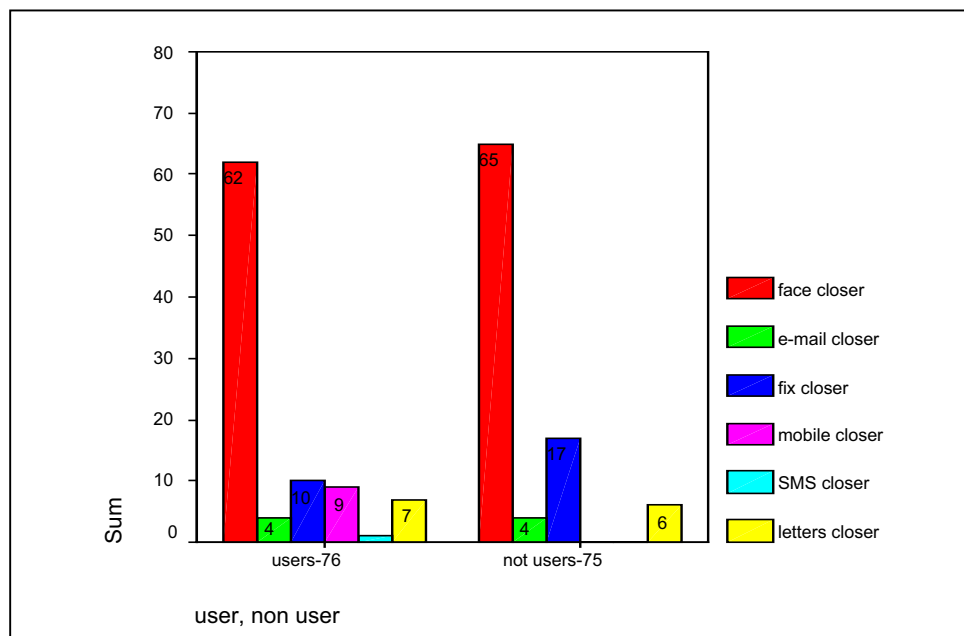


Figure 18. Sum of positive answers to the statement: I feel closer to the partner
(*Ich fühle mich dem Partner näher*)

Other statements in the study relate to the stress potential of communication and are defined by the sensations of tension, time pressure/impatience and pressure to answer. As shown in Figure 19, the majority of users considered all media as rather not stressful. However, over 30% of the user category respondents indicated mobile telephony as inducing tension. Second mentioned was the telephone verbal communication. A contrasting image provided the non-user sample: 38% of non-user respondents believed telephone conversation induced stress, immediately followed by face-to-face communication. Interesting was the difference between users and non-users concerning direct communication: as through the mobile telephony usage, users would become aware of the stressful effects of other communication technologies and considered face-to-face communication mild by comparison.

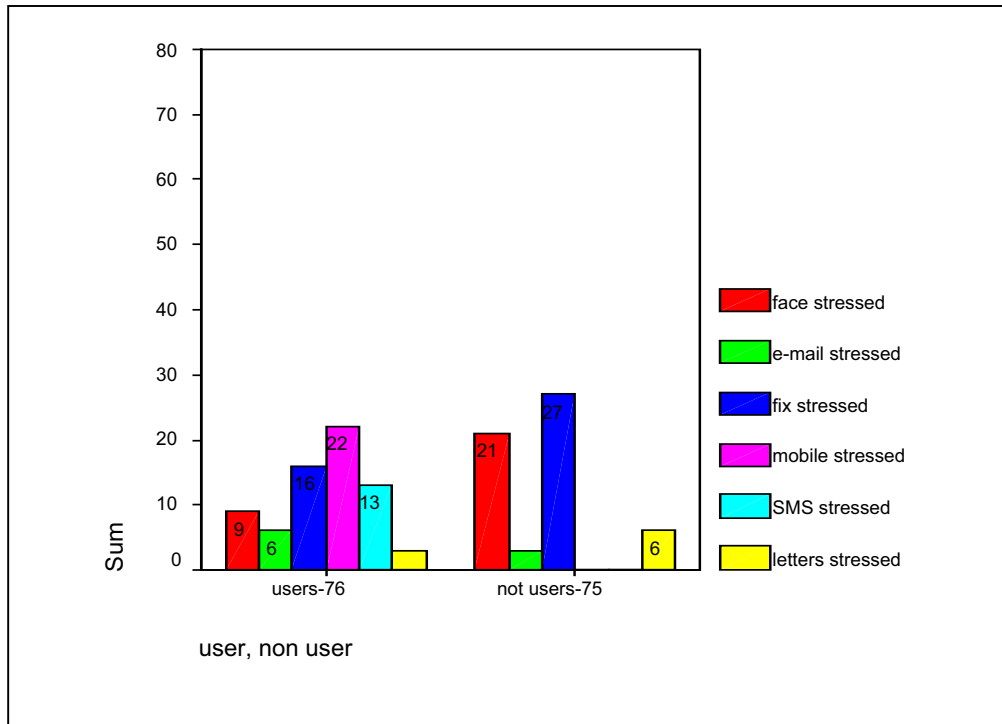


Figure 19. Sum of positive answers to the statement: I feel stressed (*Ich fühle mich belästigt, angestrengt*)

Almost one-half of user respondents considered wireless conversation hectic (Figure 20). Other communication forms were definitely less associated with this feeling. Yet, for non-users, the temporal pressure particularly characterized telephone conversation. Users and non-users definitely differed on the assessment of fixed telephony; as such with mobile telephony integration into the daily life, some part of telephony temporal rush was transferred to mobile conversation.

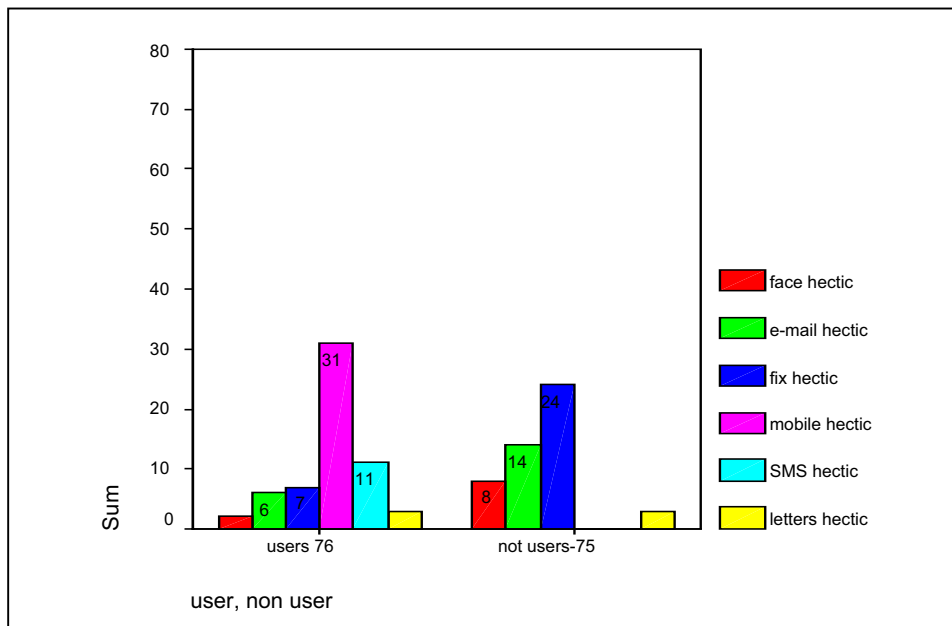


Figure 20. Sum of positive answers to the statement: I feel hurried and impatient (*Ich bin hastig und ungeduldig*)

Finally, no significant pressure to answer (Figure 21) and unpleasant expectations (Figure 22) were mentioned by users and non-users concerning all communication forms. No differences among media or among users were found.

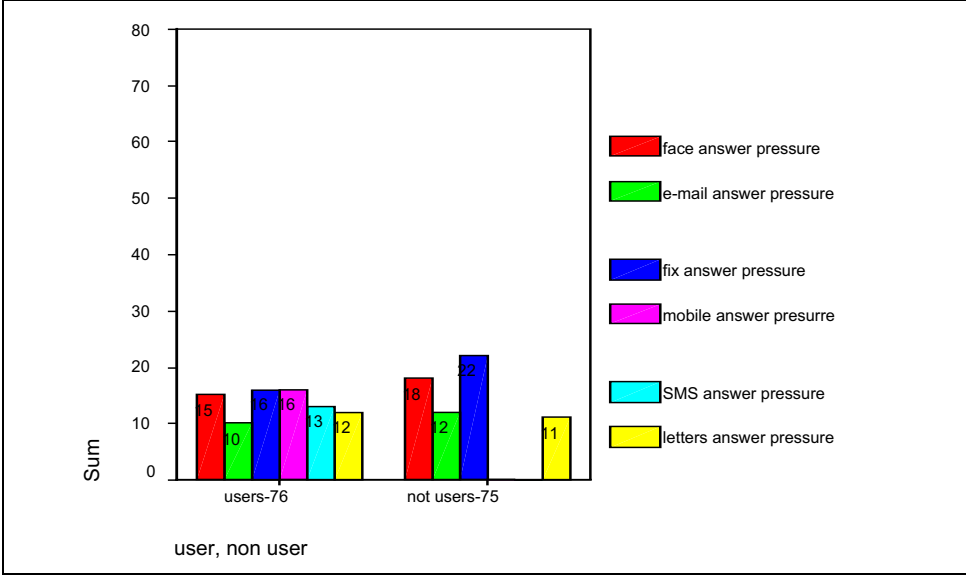


Figure 21. Sum of positive answers to the statement : I feel pressed to answer immediately (*Ich fühle mich unter Druck, unbedingt antworten zu müssen*)

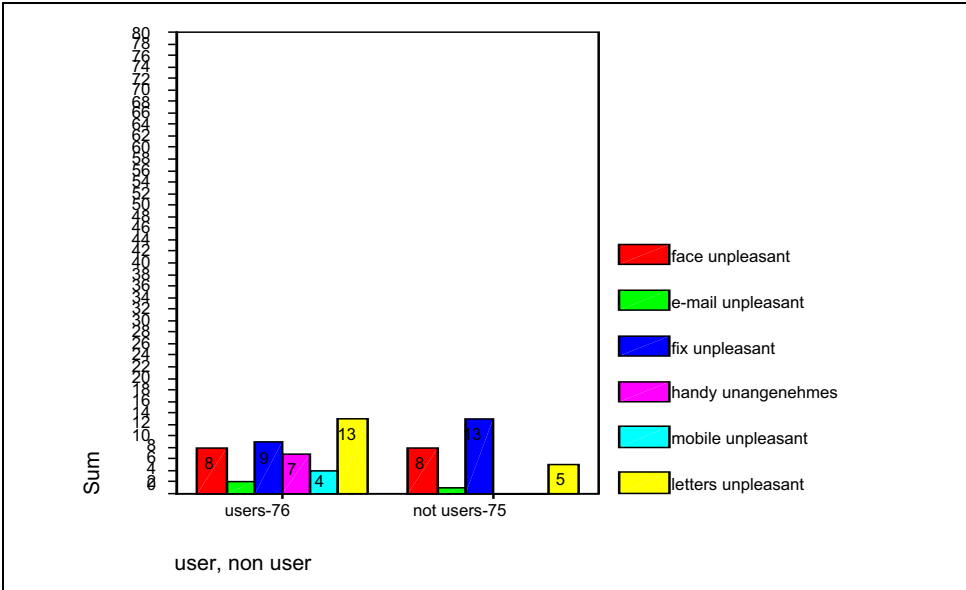


Figure 22. Sum of positive answers to the statement: I am afraid, that something unpleasant is going to happen (*Ich fürchte, daß sich etwas Unangenehmes ereignen wird*)

To synthesize the findings, the graphs below (figures 23 and 24) display the affective profiles of wireless conversation and SMS. Sums of positive answers (value of 1 of the dichotomous variables) represented the basis for analysis. It can be observed that the main reaction associated with mobile telephony was the feeling of temporal pressure (Figure 23). Almost half of users (31 answers- 41% of users) thought that the item “I feel hurried and impatient” defined wireless conversation. Second important reactions were freedom (24- answers- 32%

of user), stress (22 answers- 29% of users) and enjoyment (19 answers- 25% of users). Less mentioned affects were: feelings of unpleasant expectations (7 answers – 9% of answers), closeness (9 answers –12% of users), and the feeling of controlling the conversation (Ich führe mich mächtig , ich kontrolliere die Gesprächsführung- 10 answers-13% of users).

Thus, mobile conversation produced mixed positive and negative sensations. Although it appeared to be a hurried and somewhat stressful communication, many users seemed to enjoy it and to agree that it produces a certain amount of freedom to tell everything (Maybe one explanation for this is that in mobile telephony usage, the context can be freely chosen and changed). However, mobile communicators complained that they might lose control over their communication because of the apparatus and service constraints. The fact that users were aware of the power and coercion exerted by the technology revealed the sliding of the technical arrangements of the *dispositif* into the communication frame.

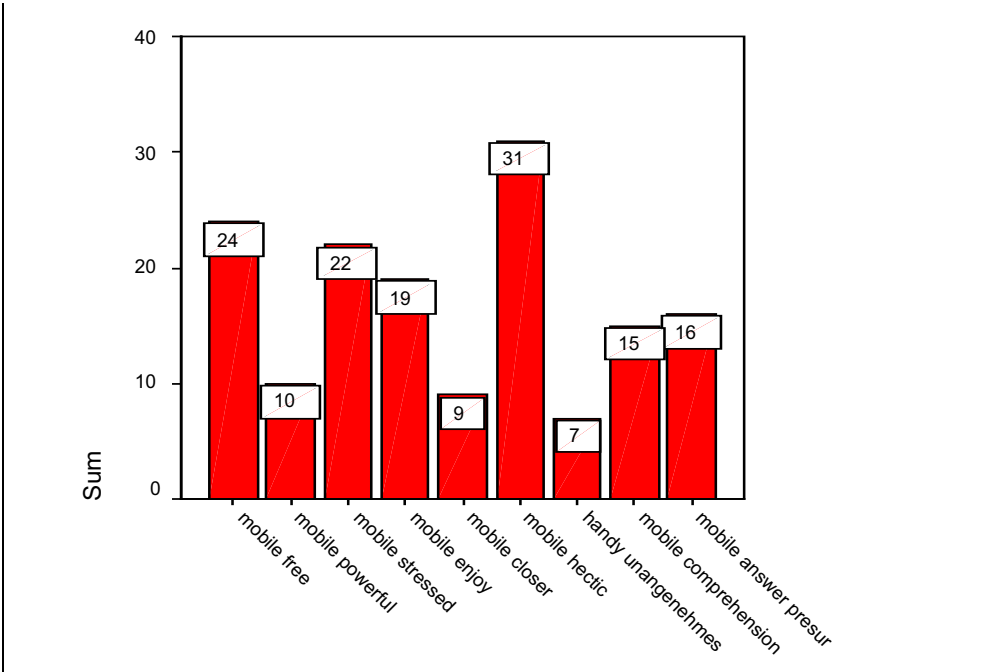


Figure 23. Affective reactions associated with mobile verbal communication

As presented in the graph from Figure 24, a rather undetermined profile defined emotional reactions in SMS communication. It can be only noticed that an important part of users considered that SMS usage induced sensations of enjoyment and lack of restrictions in communication.

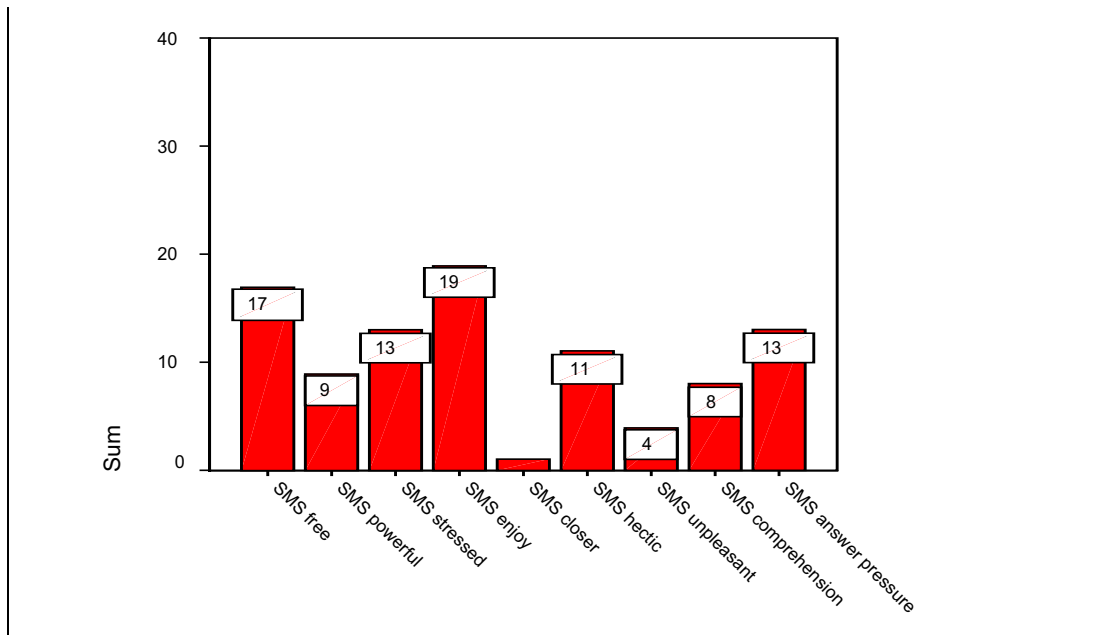


Figure 24. Affective reactions associated with SMS

Face-to-face communication was mainly associated with the impression of proximity, comprehension, and lack of restrictions (Figure 25). It appears rather free of stress, hecticness, and unpleasant expectations. From among the mediated communication forms, the most “relaxed” medium seems to be e-mail (Figure 26), which was significantly associated with enjoyment and lack of restrictions.

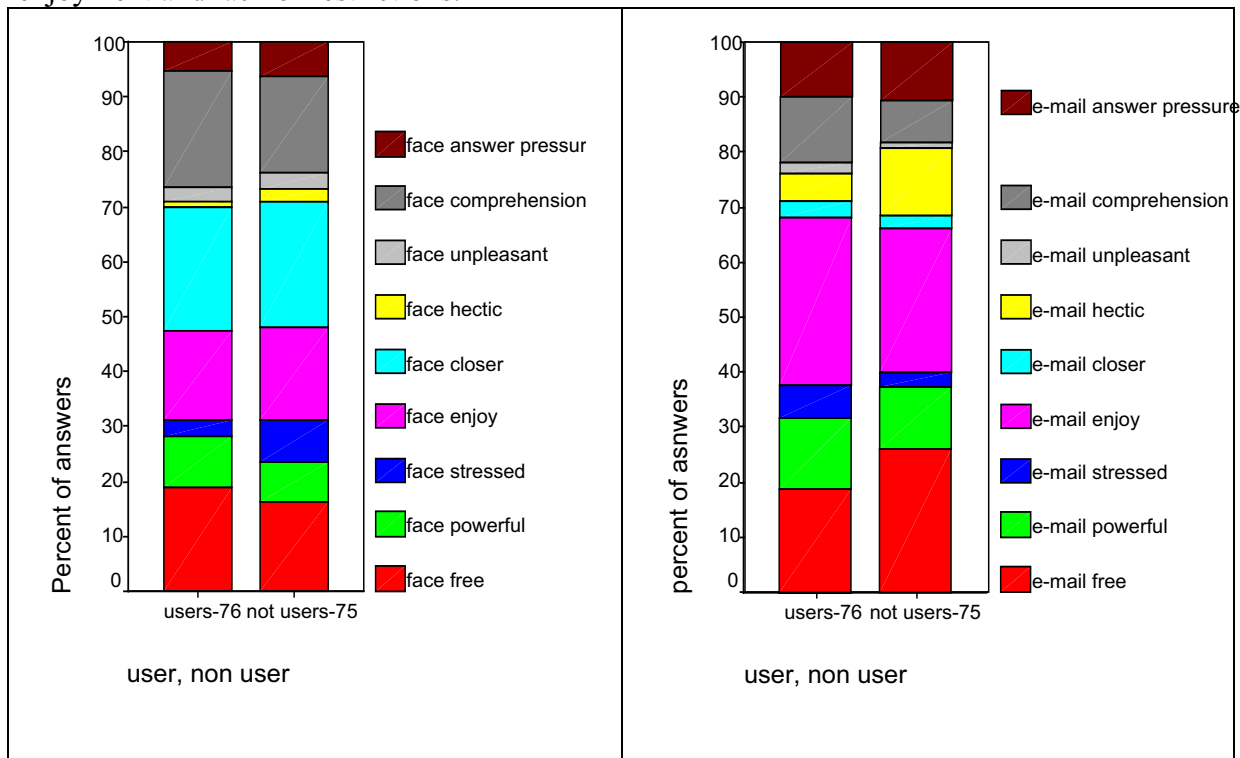


Figure 25. Affective reactions associated with face-to-face communication

Figure 26. Affective reactions associated with communication over the e-mail

A balanced pattern describes the profile of affective reactions to the fixed telephone conversation (Figure 27). Differences between users and non-users mainly concerned the feeling of temporal pressure. Letters mainly induced pressure to answer, along with some mild unpleasant expectations (Figure 28). Differences between users and non-users of mobile phones were found regarding stress, answering pressure, and unpleasant expectations.

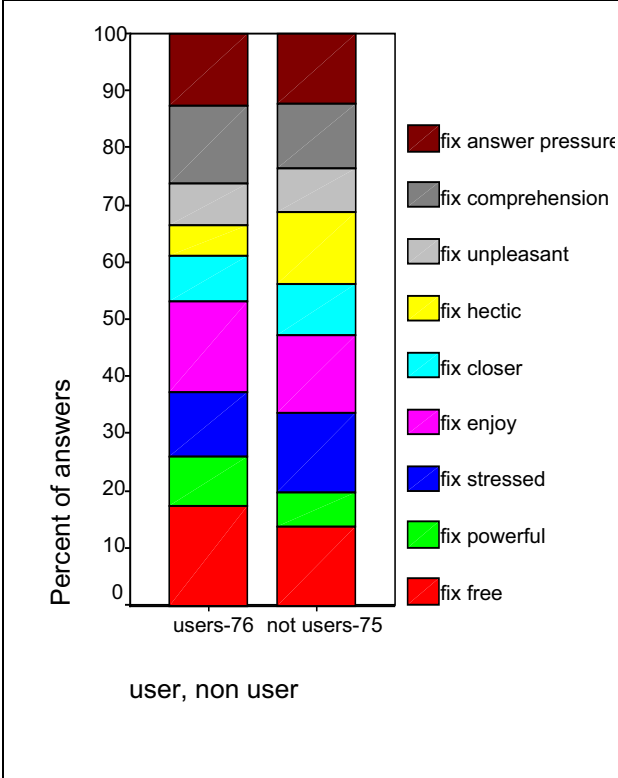


Figure 27. Affective reactions associated communication on the fixed phone

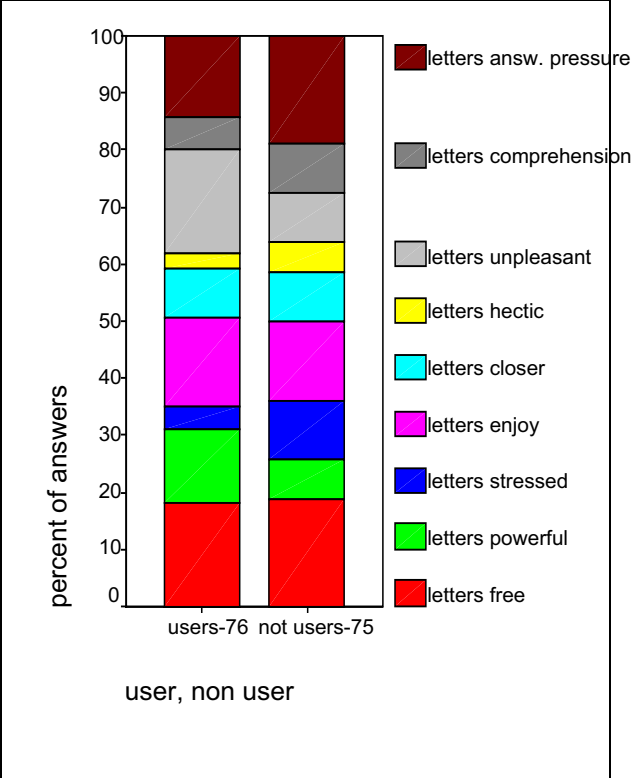


Figure 28. Affective reactions associated communication over letters

Multidimensional Scaling has been also performed on typical reactions during informal communication to establish the relative position of wireless telephony and SMS in the affective field of communication (Figure 29).

Several differences between the positioning produced by users and non-users can be highlighted. First, mobile users tended to perceive the affective reactions to the classical telephony as definitely different from the reactions to mobile telephony. The detailed analysis reveals that users regarded telephone conversation as less hectic and stressful in comparison with the more hectic and stressful wireless conversation. Second, users and non-users differently constructed the affective profile of face-to-face communication. The distance between users' positioning of the affective profiles of mobile telephony and direct communication appeared to be greater than the distance between non-users' reactions in classical telephony and their reactions in direct communication. On the one hand, mobile users felt a gain in comprehension of face-to-face communication in comparison with non-users. On the other hand, direct contact appears for them to be less hectic and stressful than for non-users. These adjustments might derive from a comparative action that users performed in their daily life among various media, which transformed the perception of the competing *dispositives*: wireless and direct communication.

From the additional cluster analysis (notice the circles in Figure 30), it can be observed that the affective pattern of mobile conversation perceived by users falls into the same group with the affective profile in telephone conversations produced by non-users. At d=5 (the smallest distance to be considered), main clusters were:

- 1: letters perceived by users and non users + the fixed phone perceived by users + SMS perceived by users
- 2: email perceived by users + e-mail perceived by non-users
- 3: mobile conversation perceived by users and fixed phone conversation perceived by non-users
- 4: face-to-face conversation perceived by users and non-users

Derived Stimulus Configuration

Euclidean distance model

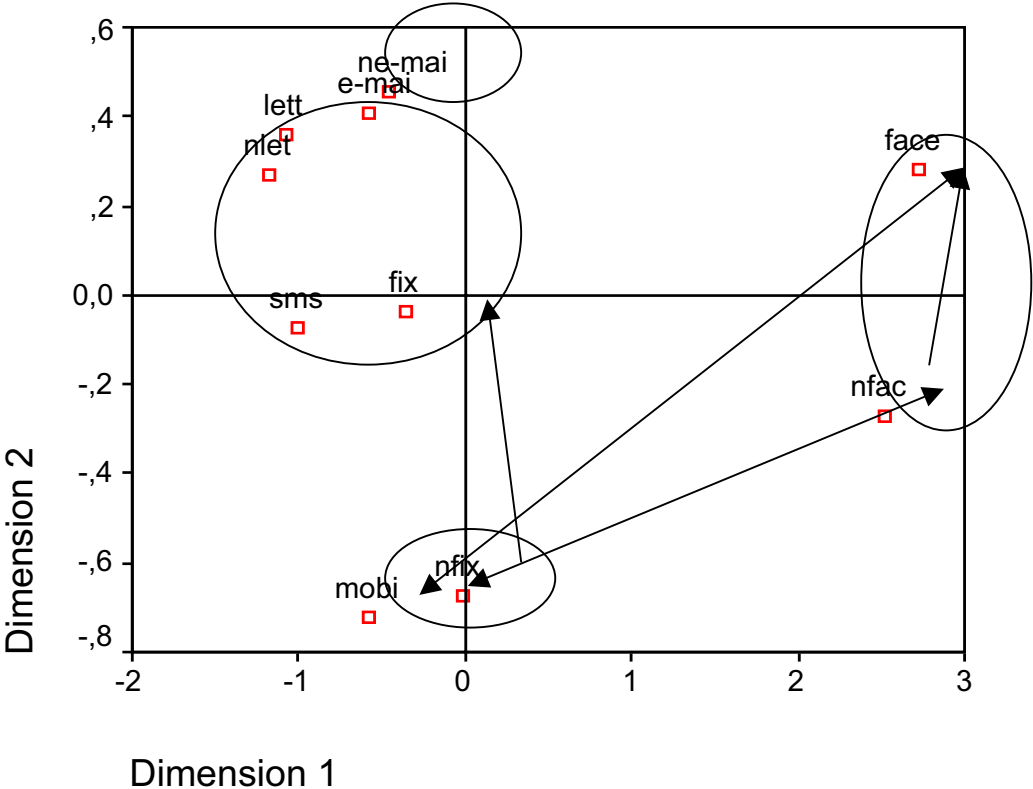


Figure 29. Multidimensional scaling of the media according to the affective reactions.

Note: The circles represent clusters
 “n” before the name of the communication form indicates the “non user category”.

Affective Reactions in Formal Communication Setting

The same comparative question was stated for the setting of formal communication. SMS was excluded from analysis. According to mobile users, the best means to conduct an enjoyable and warm professional communication was the direct contact. Communication through letters and over the fixed phone was perceived as rather cold, although efficient. In the work sphere, mobile phone usage was associated with stress, hurry and some mild unpleasant expectations. The e-mail enjoyed a particular position, because it was perceived as rather free from fear and stress. It can be concluded that this medium can represent one of the best “affective“ solution in the professional communication area. As it can be seen in the graphs below, the impression of lack of constraints in formal communication was mostly facilitated by the direct contact, followed by e-mail. The number of users who associated mobile conversation with communication “liberty” was almost similar with the one of those who selected the e-mail for this feature. The sensation of “power” featured an almost similar pattern, with the difference that, in general, only a few users and non-users acknowledged the fact that a formal setting could make someone feel in charge of conversation.

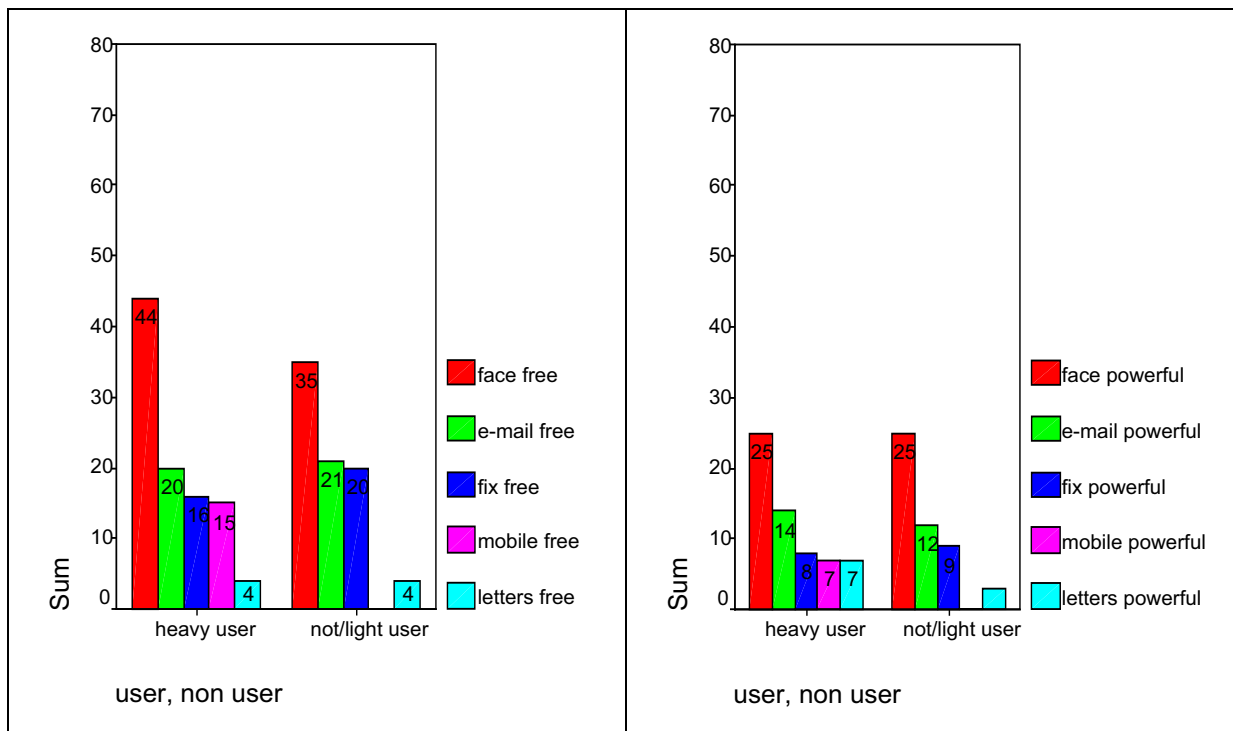


Figure 30. Sum of positive answers to the statement: I feel free (*Ich fühle mich frei, alles besprechen und machen zu können*)

Figure 31. Sum of positive answers to the statement: I feel powerful, I control the conversation. (*Ich fühle mich mächtig, ich kontrolliere die Gesprächsführung*)

Almost one-fourth of users thought that mobile communication induced stress. Although this percent is rather low, mobile conversation was the most frequently associated form with this sensation (Figure 32). In formal communication, enjoyment was not regarded as an important issue; therefore, this accounts for the small number of mentions for all media (Figure 33).

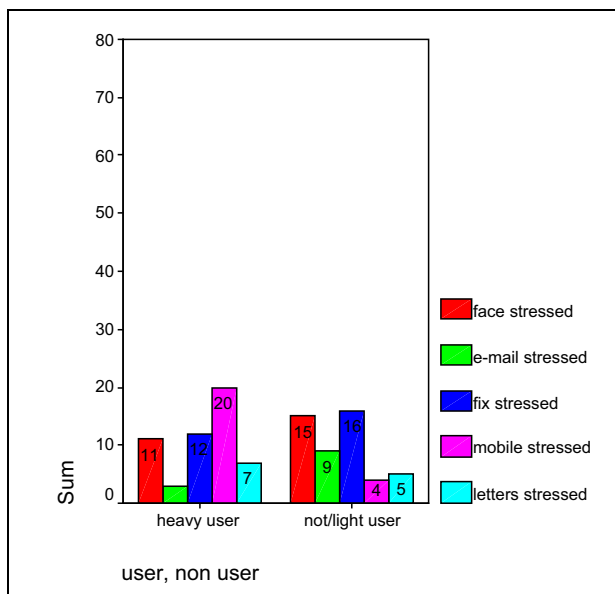


Figure 32. Sum of positive answers to the statement: I feel stressed (*Ich fühle mich belästigt, angestrengt*)

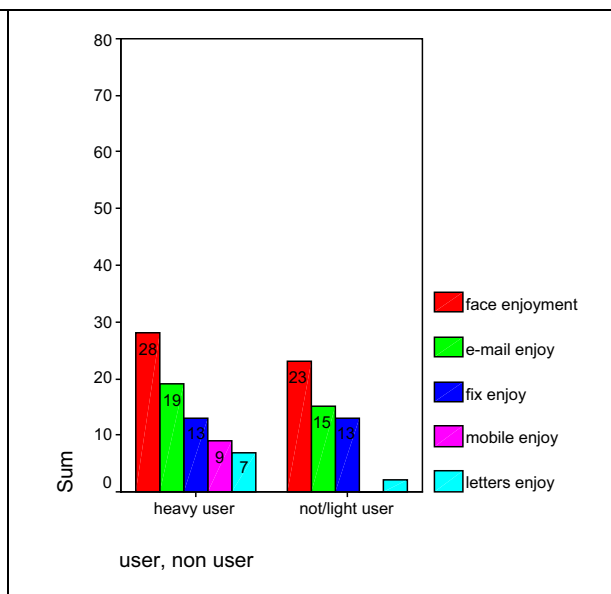


Figure 33. Sum of positive answers to the statement: I really enjoy it (*Macht mir wirklich Spaß*)

Less than a fourth of users and non-users considered that the usage of all media was associated with the feeling of temporal pressure. However, for the majority of users who mentioned this feature, mobile communication emerged as one of the most hectic communication forms in a formal setting. Also, in terms of content comprehension, mobile telephony ranked the highest, after the direct contacts.

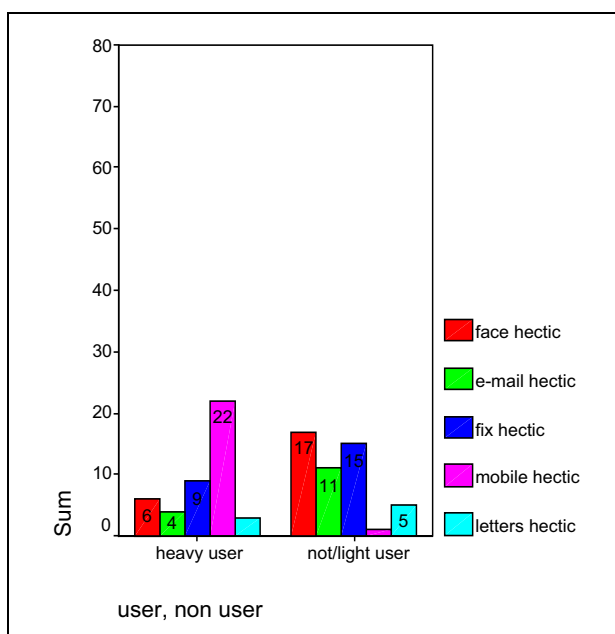


Figure 34. Sum of positive answers to the statement: I fell hurried and impatient (*Ich bin hastig und ungeduldig.*)

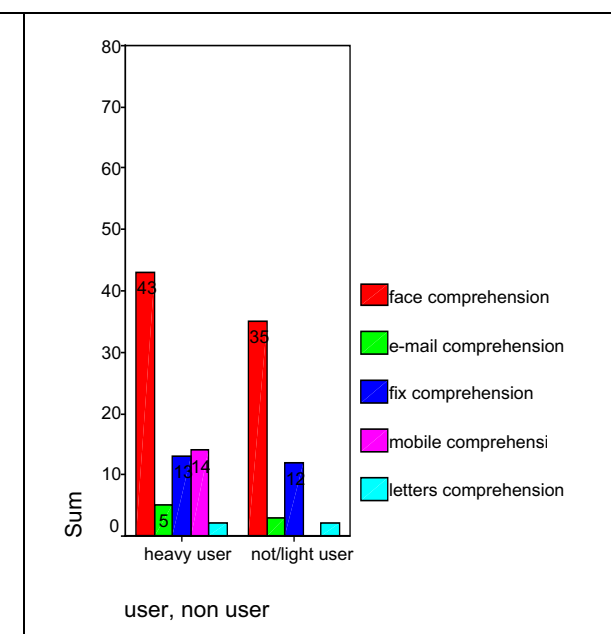


Figure 35. Sum of positive answers to the statement: I can fully understand what the partner means (*Ich kann den Partner völlig verstehen*)

The large majority of users and non-users did not consider that the studied media induced unpleasant expectations. However, for users, mobile conversation ranked the first on this item.

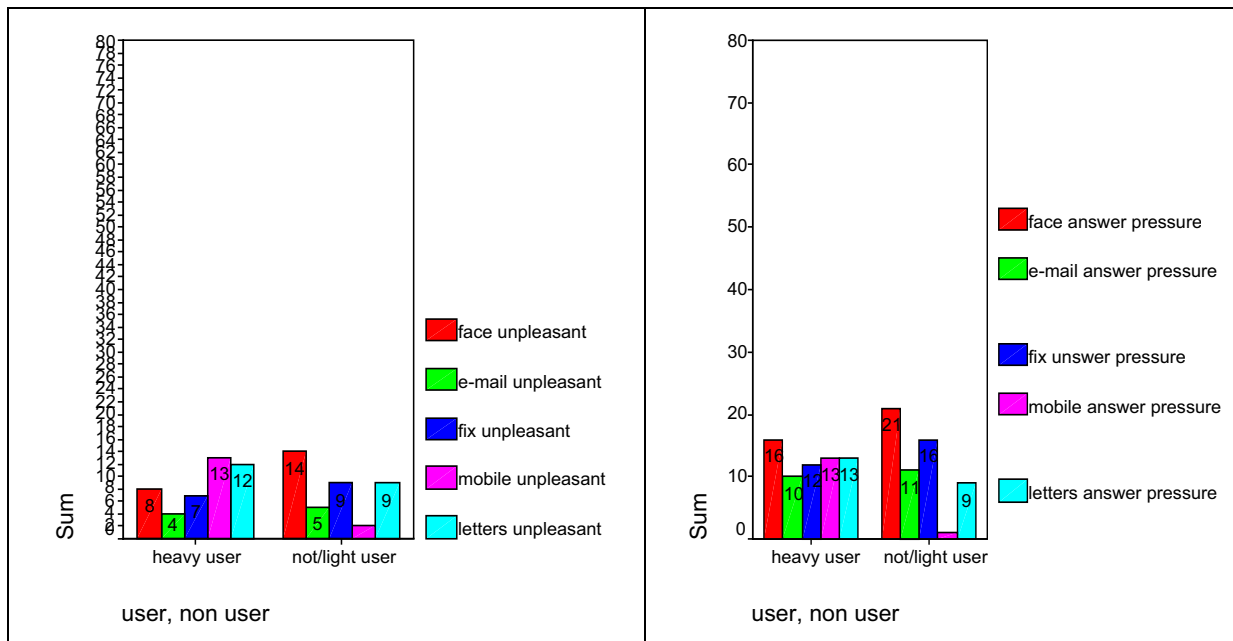


Figure 36. Sum of positive answers to the statement: I am afraid, that something unpleasant is going to happen (*Ich fürchte, daß sich etwas Unangenehmes ereignen wird*)

Figure 37. Sum of positive answers to the statement: I feel pressed to answer immediately (*Ich fühle mich unter Druck, unbedingt antworten zu müssen*) something unpleasant is going to happen (*Ich fürchte, daß sich etwas Unangenehmes ereignen wird*)

Two main conclusions can be drawn from all the results about the re-building of mobile communication structure. Firstly, in terms of communication issues, the mobile verbal communicative structure evolved as distinct from the face-to-face paradigm. Far from being purely talkative and communicative, the new “arrangement” can best be defined by the concept of short contact (sociable/coordination). The SMS also constructs its own profile distinctive from verbal mobile communication or other forms of mediated interaction and tended to be a preferred facility to solve urgent problems, to perform spatial-temporal coordination, and to manage in-group sociability.

Second, it seems that mobile technology usage interacts indeed with the usage and perception of other communication media. Readjustments in the situational and affective profile of these media can partially explain the usage of mobile telephony. A plus of sociability, coordination, and risk management seems to migrate from the email and fixed phone conversation to mobile communication (verbal and SMS).

4.3.3. Spatial and Temporal Arrangements in the *Dispositif*: the Disrupted Communicative Mobility

4.3.3.1. Mobility and Localization

Communicative mobility in mobile telephony usage has previously been defined as a type of movement behavior encountered when the cell phone user changes places while communicating. Key dimensions of this include: exploitation of space while using the cell phone; travel patterns; communication places; orientation; and temporal and spatial perceptions. The current study intends to bring its contribution to the clarification of the relation between mobility patterns and communication and to characterize the process of localization in mobile telephony usage. The analysis is mainly conducted on three categories of variables. The first category includes questions about the frequency of voyages and travel distances. Users and non-users had to estimate how much time they usually spent on-the-way, traveling with various purposes. Next, they assessed the frequency of their travel at various given distances. The second group of variables asks about users' and non-users' perceptions of their mobility, orientation skills and effects of wireless technology usage on movement. Last but not least, places to initiate/receive mobile communication are explored.

Below, Table 1 reveals the average travel time for a set of given purposes. Concerning the irregular business travel, the study identified a tendency of mobile users to do longer trips than non-users, although the difference between samples was only slightly significant ($p=0.06$).

Table 1. The amount of travel in hours (for commuting and irregular professional travel) and in days (for holiday travel and other private travel)

	user, non user	Mean	Std. Deviation
Commuting in hours (<i>Pendlerfahrten</i>)	heavy user	.832	.796
	not/light user	.747	.745
Irregular professional travel in hours ° (<i>unregelmäßige berufbediente Fahrten</i>)	heavy user	1.11	1.86
	not/light user	.58	1.36
Holiday travel in days (<i>Urlaubreisen</i>)	heavy user	17.71	14.89
	not/light user	14.84	11.46
Other private travel in days (<i>andere private Fahrten</i>)	heavy user	32.31	49.85
	not/light user	27.74	39.16

Notes: °The Mann-Whitney test gave slightly significant results $p < 0.1$

Cross analyses revealed that the amount of private travel was influenced by the degree of mobile phone usage experience (Table 2). A specific variable was constructed from the index of experience with mobile technology including the following categories: inexperienced (low and medium together), very experienced users, and non-users. This index was constructed from two variables: the frequency of cellular telephony usage (scale running from 1-never to 5-very often) and the duration of usage in months, after the formula: $\text{Indexp} = \text{Frecv} * \text{Length}/100$. As shown in Table 2, experienced users traveled for private purposes longer than the inexperienced ones and non-users. The difference among the three categories of usage experience was highly significant ($p=0.004$).

Table 2. The duration of travel in days for *other private travel*. Cross analysis by the categories of experience with mobile telephony.

	Experience degree			Kruskall Wallis p
	Less experienced (Base 31)	More experienced (Base 50)	Non users (Base 70)	
Another private travel (days)**	Mean	12.57	44.47	27.44
	Median	5.00	20.00	10.00
	Std Deviation	20	58	39
				P= 0.004

Note:** The Kruskal Wallis test of difference for independent samples gave highly significant results (p 0.01). Difference occurred between inexperienced- experienced, and experienced-non-users

Next, the detailed degree of usage experience for mobile users only has been introduced into analysis (Table 3). There were significant differences between the three usage categories in terms of the duration of private travel.⁸⁷ Medium and high experienced users were definitely more mobile than the less experienced ones.

Table 3. Private travel in number of days. Cross analysis by the degree of experience of users only (Base 76)

	Low (Base 26)			Medium (Base 29)			High (Base 21)			Kruskall Wallis –
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev	
Other private travel (days)**	12.57	5.00	20.17	45.36	22.50	49.47	43.16	10.00	69.44	P=0.001 (1-2)

Note **The Kruskal Wallis test of difference for independent samples gave highly significant results (p 0.01). The difference occurred between low and medium-experienced users

The following step was to analyze the travel duration across some socio-demographical variables, such as: age (Table 4 in Appendix); gender (Table 4); education (Table 5); and occupation (Table 6).

If the difference between users and non-users is examined (see Table 50 in Appendix), no statistical difference occurred between the usage categories in the studied age segments. There was indeed a slight tendency of middle-aged users to do more irregular business travel, but it should be recognized that the small sample hasn't had sufficient statistical power to capture such a fine effect. A larger study may be able to confirm these differences. Considering the differences between users and non-users across gender categories (Table 4), it appeared that male users spent more time doing irregular professional trips than male non-users. No difference occurred between female users and non-users.

⁸⁷ However, it should be mentioned that the sub-samples differed in terms of gender and occupation. Therefore, the difference might come from the joint action of experience degree, gender and education. Anyway, a first clue in this stage could be that medium-experienced users seem to travel more than the low-experienced ones. Higher experience brought no increase in the amount of private travel; which seemed to remain constant, at a rather high level.

Table 4. Irregular business travel in number of hours. Cross analysis by usage within the male group

gender		heavy user (Base 49)	not/light user (Base 50)	Test results Mann Whitney
Male (99)	Irregular professional travel (hours) Mean	1.31	.65	Signif at p=0.042
	Median	.10	.00	
	Std Deviation	1.84	1.53	

Notes: *The Mann-Whitney test gave significant results ($p < 0.05$) for irregular professional travel in the case of male users

Another group of questions explored the relationship between wireless telephony usage and the extent of mobility. Users' and non-users' travel at various distances was examined. A 5-point scale running from 1-never to 5-very often was employed to assess the frequency of their travel to increasingly remote destinations formulated as statements. Figure 1 presents the means of users' and non-users' answers. The majority of users and non-users in the sample declared that they frequently traveled in the city, in the same part of the city, or in the vicinity. It can be noticed that mobile users scored slightly higher on near mobility (travel in the vicinity, usually by foot) and remote mobility (requires vehicles) than non-users. However, a single clear significant difference between user and non-user sub-samples occurred concerning the item *traveling abroad* (Mann-Whitney $p=0.006$).

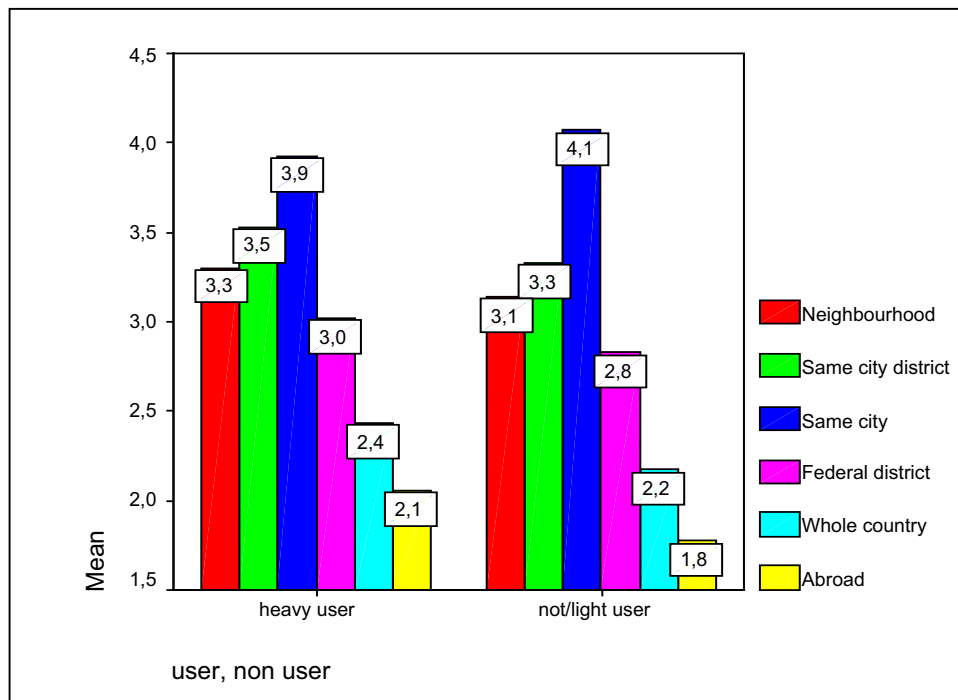


Figure 1. Traveling at various distances. Means running from 1- never to 5- very often, daily

If the answers in the user sub-sample are examined with the help of the categories of the experience index, the difference in case of the travel inside the country became much more salient, being statistically significant at $p < 0.05$ (Table 5). The experienced users traveled inside the country more frequently than the inexperienced ones. A heavier usage of mobile telephony associated thus with an increase in remote **mobility**. By providing both reassurance and information, mobile phones could prove to be excellent means to remotely control the daily life. Nevertheless, the **near mobility** (travel in vicinity) remained unaffected by usage experience.

Table 5. Travel frequency at various distances. Scale running from *1-never to 5-very oft*. Cross analysis by experience of users with the mobile technology (only users, total base 76)

	Inexperienced (Base 26)			Medium experienced (Base 29)			Very experienced (Base 21)			Kruskal Wallis- p
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev	
Within Germany*	2.08	2.00	.50	2.35	2.00	1.06	3.10	2.50	1.29	P=0.018 (2-3); (1-3)
Abroad °	1.87	2.00	.45	2.43	2.00	.99	1.94	2.00	.56	P=0.051 (2-3*) (1-2)

Note: *The Kruskal Wallis test of difference for independent samples gave significant results p 0.05). The difference appeared between inexperienced users and very experienced, and between medium experienced and very experienced users

°The Kruskal Wallis test of difference for independent samples gave slightly significant results (p 0.1). The paired differences appeared between medium-experienced and very experienced users, and inexperienced and medium-experienced users.

Several cross analyses examined the impact of mobile phone usage on travel distances across various age categories. Unfortunately, no relevant interaction of age, usage and travel distances could be singled out (see Table 51 in Appendix). The general tendency of both users and non-users of all ages was to travel more frequently inside the city area, rather than in the district, country, or abroad.

Within gender categories (table 6), significant differences appeared between male users and non-users regarding the frequency of travel within the country, with male users traveling more often at this distance than male non-users. The same pattern was revealed by the analysis of the female group, but related to the travel abroad.

Table 6. Travel frequency at various distances. Cross analysis by gender. Scale running from *1-never to 5-very oft*.

Gender		heavy user (Base 76)	not/light user (Base 75)	Mann Whitney Test results
Male (Base 99)	Within Germany*	Mean <u>2.72</u>	2.33	Sign at p=0.035
		Median 2.00	2.00	
		Std Deviation 1.05	.94	
Female (Base 52)	Abroad **	Mean <u>2.35</u>	1.68	Sign at p=0.007
		Median 2.00	2.00	
		Std Deviation .98	.48	

Notes: **The Mann-Whitney test of difference between independent samples gave significant results (p 0.01) for travel frequency abroad for female users

*The Mann-Whitney test of difference between independent samples gave significant results (p 0.05) for travel frequency in Germany in the case of male users

From the previous part, it can be noticed that the relationship between physical mobility and wireless technology usage is difficult to define, due to the short period allocated to the structural re-building of communicative mobility. Nevertheless, subjective evaluations of it may be able to detect early associations building in the minds of the respondents on this subject. Indeed, the current study discovered that cell phone users attributed a certain influence of wireless telephony ownership and usage on their travel, orientation skills, and mobility in the physical space (Table 7). In particular, more than half of user respondents believed that the mobile calls generally modified a previously established route. This response

confirms the intrusion of the technology in daily planning, due to the additional information provided by the mobile call. Over one-third of users maintained that mobile telephony saved travel, a fact that signaled their availability to solve daily problems over the virtual route furnished by the medium, in the absence of direct contacts.

Table 7. Direct estimation of the effect of mobile calls on travel. Users (Base 76)

Answers to the pre-coded question: 2.16. Which effects has the usage of the mobile phone on the organization of private/ professional travel?

Effect (changes the route, initiates a route, saves the travel)	55
No effect	45

The picture is reversed in the case of the effect of fixed phone calls on travel (Table 8).

Table 8. Direct estimation of the effect of fixed phone calls on travel. Users (Base 76).

Answers to the pre-coded question: 2.16. Which effects has the usage of the string phone on the organization of private/ professional travel?

Effect (changes the route, initiates a route, saves the travel)	31
No effect	69

The most important effects of the fixed phone call on travel mentioned by user respondents were: "the call saves the travel" (*Der Anruf machte einen Weg unnötig, sparte die Reise*), followed by "the call changes the initial route" (*der Anruf änderte eine bereits begonnene Reise*). Non-users expressed very similar opinions about the effects of the fixed phone.

Table 9 . Direct estimation of the effect of fixed phone calls on travel. Base non-users (75)

Answers to the pre-coded question: 2.16. Which effects has the usage of the string phone on the organization of private/ professional travel?

Effect (changes the route, initiates a route, saves the travel)	35
No effect	65

In addition to the previous questions, two other statements about personal orientation skills and the impression of the increase in mobility with the passage of time have been formulated. Users and non-users were asked to give their opinion on a 5-point scale running from 1- *definitely disagree with the statement* to 5- *definitely agree with the statement*. Overall, results revealed that respondents perceived themselves as having rather good orientation skills in the physical space. No particular perception of an increased mobility emerged from the analysis on total sample.

Table 10. Self-perceptions of mobility and orientation

	heavy user (Base 76)			not/light user (Base 75)		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
I can orientate myself very good in the city or elsewhere	3.74	4.00	.98	3.80	4.00	1.03
I feel that I travel more than before	3.06	3.00	.84	2.82	3.00	1.09

Note: Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

Although the mobile phone usage variable failed to discriminate between total sample assessments, analyses of gender and education sub-samples revealed important differences between users and non-users in the perception of an increase in physical mobility. For instance, the analysis along gender and education categories by usage (tables 11 and 12) showed that male, respectively higher-educated users perceived themselves as more “mobile” than non-users of the same type.

Table 11. Perceptions of mobility and orientation. Analysis across usage down gender categories

Gender	Statements	heavy user (Base 76)			not/light user (Base 75)		
		Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
Male (Base 99)	I can orientate myself very good in the city or elsewhere	3.91	4.00	.98	4.04	4.00	.91
	I feel that I travel more than before*	3.24	3.00	.80	2.76	3.00	1.08
Female (Base 52)	I can orientate myself very good in the city or elsewhere	3.44	3.50	.93	3.32	3.00	1.11
	I feel that I travel more than before	2.73	3.00	.83	2.94	3.00	1.14

Notes: Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

*The Mann-Whitney test of difference between independent samples gave significant results (p 0.05) for *I feel I travel more than before* in the case of male users

Table 12. Self-perceptions of mobility and orientation. Analysis across usage down education categories

Education		heavy user (Base 76)			not/light user (Base 75)		
		Mean	Median	Std. Dev	Mean	Median	Std. Deviation
Low (Base 18)	I can orientate myself very good in the city or elsewhere	3.37	3.50	.96	4.00	4.00	.63
	I feel that I travel more than before	2.60	2.75	.76	3.33	3.00	1.03
Medium (Base 65)	I can orientate myself very good in the city or elsewhere	3.70	4.00	1.07	3.96	4.00	1.05
	I feel that I travel more than before	3.03	3.00	.90	2.73	2.88	1.28
High (Base 66)	I can orientate myself very good in the city or elsewhere	3.95	4.00	.87	3.60	4.00	1.06
	I feel that I travel more than before*	3.28	3.00	.74	2.78	3.00	.95

Note: Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

*The Mann-Whitney test of difference between independent samples gave significant results (p 0.05) for *I feel I travel more than before* in the case of high educated users

Within the user category (table 13), more experienced users tended to perceive themselves as having improved orientation skills and more mobile in the physical space than the less experienced ones.

Table 13. Self-perceptions of mobility and orientation. Cross analysis by the degree of experience

	Experience index (users base 76)									
	Low (Base 26)			Medium (Base 29)			High (Base 21)			
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation	Kruskal Wallis, p
I can orientate myself very good in the city or elsewhere (1-3)*	3.37	3.50	.98	3.87	4.00	.85	4.07	4.00	.98	0.023
I feel that I travel more than before (1-2) (1-3)**	2.68	3.00	.57	3.15	3.00	.83	3.43	3.25	.94	0.005

Note: Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

*The Kruskal Wallis test of difference between independent samples gave significant results (p 0.05)

**The Kruskal Wallis test of difference between independent samples gave highly significant results (p 0.01)

The localization frame in the *dispositif* is constructed by the fragmented mobile communication space of intertwined private and public areas. Previous research showed that cell phone users tended to indicate to each other their current location (and situational circumstances), so that basic premises about the communicative context could be formed. This urgent need for knowing each other's place is proven by the fact that "in most unexpected calls, the question "where are you?" is immediately asked during the first seconds of the connection" (Townsend 2000; Laurier, 2001 quoted in Geser, 2003)⁸⁸. As a result, in mobile telephony, communication mentally takes place in a mixture of known and unknown spatial contexts, with unclear, always extending boundaries, a hybrid space of inter-related concrete places. These places seem to be well-anchored in the physical public space and are ordinarily invested with versatile social and objective meanings⁸⁹.

Although there is little research on where mobile phones are used, several studies indicated places where mobiles are switched on. For instance, a European study, conducted by Telecom Italia in 1996, in France; Germany; Italy; Spain; and the UK revealed that the most likely location to allow mobile communication (the mobile switched on) was the car, "as a relatively private space". The most "prohibitive locations" were theaters. Interestingly, between a fifth and a third of interviewees in the quoted research always had their phone switched on when they were at home, which, according to Ling and Haddon, "is a sign that at least some are adopting the mobile phone as their personal terminal through which they can be contacted at all times—as opposed to just using it when they are out of home and reverting to the domestic line when at home" (Ling, Haddon, 2001, p. 6).

Accordingly, the current survey asked not only about the usage of mobile phone in "mobile" locations to be reached while traveling, but also about mobile calls made and received at home and at work. Let's take a closer look at the places where the call was taken or initiated that define the combined spatio-temporal arrangement of wireless technology usage:

⁸⁸Nevertheless, the information provided may also be intentionally false, as an American study gave about that fact that 20% of users lie about their current location. (Chihara, 2000, quoted in Geser, 2003).

⁸⁹As Geser observed, "the fact that I know where my distant partner is located facilitates interaction insofar as I know many reliable things about his current surroundings: e.g. that his wife and children are likely to eavesdrop because they are present in the same apartment, or that I could easily ask him to buy me some items in the nearby store. The cell phone of course destroys such certainties, so that partners face more insecurity about many premises which have a decisive influence on the format and content of their conversation: e.g. whether both are currently disposed to address certain intimate topics or to engage in a longer, multi-topic conversation" (Geser, 2003, online citation).

Table 14. Usual places for the mobile call.

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Home	Fix place	32	16	44
The office	Fix place	43	21	58
The city	Mobile place	48	23	67
Countryside. forest	Mobile place	35	17	49
In the car/train	Mobile place	44	21	61
Other place	Mobile place	5	2	7
		-----	-----	-----
Total responses		207	100.0	286*

Note: Sum over 100 due to the multiple answers

Results in Table 14 indicate that around 60% of user responses related the call to a mobile location - cars or streets/stores within the city - although several interlocutors spontaneously declared that they were at home or in the office when communication reached them (fix locations) (Table 14). Interestingly, the source-communicators generally knew where the calling partner was. His or her location usually resulted from the question, “where are you now?”, but might also come from the knowledge (or intuition) of the interlocutor’s daily agenda (Table 15). Analysis of locations for both communicator and partner also revealed an important tendency to employ the mobile phone to receive calls from fixed places with available fixed phones. By the way, the rather high usage of the classical telephony service inside the mobile system has been fully understood and exploited by wireless providers who are now offering low-tariff communication with the classical telephone system.

Table 15. Usual places from where the partner calls

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
From home	fix place	42	22	63
From the office	fix place	45	22	67
From the city	mobile place	39	20	58
From the countryside. forest	mobile place	29	15	43
From the car/train	mobile place	33	17	50
From other place	unknown	7	4	10
		-----	-----	-----
Total responses		195	100	291

Note: Sum over 100 due to the multiple answers

4.3.3.2. Is there a „Mobile Chronotype“?

Next to space, how is time perceived and experienced in mobile telephony? The subject of the impact of new communication technologies on time perception and experience has indeed fascinated many authors. For instance, Paul Virilio⁹⁰ maintained that in the usage of the new communication technologies, real time now prevailed above both real space and the geosphere. The primacy of real time, of immediacy, over and above space and surface is “a fait accompli and has inaugural value (ushers a new epoch). Something nicely conjured up in a (French) advertisement praising cellular phones with the words: ‘*Planet Earth has never*

⁹⁰ Paul Virilio, „Speed and Information: Cyberspace Alarm!”, appeared in French in *Le Monde Diplomatique*, August 1995, translated by Patrice Riemens, University of Amsterdam.

been this small” (Virilio, 1995, online). Paul Virilio is also renowned for his declaration that the logic of acceleration lies at the heart of the organization and transformation of the modern world.

Also, the concept of "achronos," defining this compressed time of modern network society, could be appropriate for describing how time is perceived and “communicated” in mobile telephony: compressed, carefully measured, all against the old expression: *take your time* (Tella, 2000). Tella said that, while in direct communication, space and time were united, and communication technologies have created mediation and communication delay. The paradox is that the faster the communication and the more efficient the technology at our disposal are, the less time we seem to have to react and to think about our reactions, replies and answers. The information and communication technology revolution has compressed time and space into a new ‘world *oikoumene*’, strongly oriented towards the present and future, while past societies were mostly space-bound or time-bound. This idea comes closer to Townsend’s assertion that social settings in mobile telephony are “real-time systems” where everything happening is conditioned by *current* situations, while the impact of the past (effected through rules and schedules) and of the future (impinging in the form of planning activities) decline (Townsend 2000)⁹¹. If time descriptors in face-to-face communication and mobile telephony are compared (Figure 2), in face-to-face conversation, time is perceived as generally “natural”, as it is, and it flows rather freely; its relaxed nature allows pauses, feedbacks, and redundancy. On the contrary, in mobile communication, there is consistent pressure to provide an immediate response.



Figure 2. Comparison between face-to-face and mobile communication temporal descriptors

In mobile communication, the temporal terms are much more precisely defined, with a particular insistence on exact hours and schedules. Results from a former qualitative study

⁹¹ “The most important change that occurs in observations of subjects who completely adapt to the new lifestyle opportunities of mobile phones, however, is that time becomes a commodity that is bought, sold, and traded over the phone. The old schedule of minutes, hours, days, and weeks becomes shattered into a constant stream of negotiations, reconfigurations, and rescheduling. One can be interrupted or interrupt friends and colleagues at any time. Individuals live in this phonespace they can never let it go, because it is their primary link to the temporally, spatially fragmented network of friends and colleagues they have constructed for themselves.” (Townsend 2000).

(conversation diaries and taped conversations) carried out in 2001 in Romania⁹² have shown that ideas about time are structured in function of some temporal schemes:

Focus on the present moment:

I'm coming after you now
Wait!

Scheduling the next call or appointment

I'm calling you tomorrow
Call me Sunday evening

Time intervals

Be here in 10 minutes
How long are you staying at the university?
Until 2 o'clock
Five minutes ago, I visited you but you weren't home.

Changes in daily agenda:

Don't go directly home, drop by the drugstore and buy some sugar

Space-time descriptors:

I'm at home between 1 and 3 p.m.

Following these considerations, in this study, several statements have been formulated and handed out to be assessed on a 5-point scale running from 1-definitely disagree to 5-definitely agree. One statement describes the need of temporal precision: *One should always be punctual*; other - *I am often hurried and impatient* - tries to capture the impressions of time acceleration and compression. Other two statements correspond to the primacy of real time, immediacy and future-orientation: *I live in the present, I am not so interested in the past* and *I make often plans for the future*. Another group of statements relate to two time categories advanced by Hall (1987): monochronism and polychronism, which can also apply to a broad time categorization. Monochronism is encountered when there is a tendency to do things one after another, to concentrate more on the job than on family and relations, to prefer to work alone, and to strongly stick to schedules (Tella 2000). This evokes a sequential pastime in a continuous time flow. Every (playful or serious) action follows its own undisturbed course, one after another. On the contrary, polychronic persons tend to do several things at the same time or in parallel time segments. They treat schedules and plans rather relaxed, are especially prone to social and family relations and enjoy working in the presence of others. Their time is consequently broken, fragmented, and somewhat "playful".

The combined assessment of all these dimensions was expected to reveal some of the changes brought by technology usage in the perception and experience of time (Table 16). Overall, there was a slight tendency of non-users to score higher on monochronic statements and, for users, on polychronic ones. Nonparametric tests were employed to identify the differences between samples and to assess the effect of mobile telephony usage on various dimensions of time perception. Because the rather small sample had a correspondently low statistical power, many differences failed to prove significant. However, users categorically differed from non-users in terms of the item: *I prefer to work in the presence of others*. This item featuring fragmentation and parallel task fulfillment best associated with polychrony. It can be further

⁹² Cf. Oana Mitrea, Georgeta Cornita, *Configuration of the mental space in mobile telephony*, Transforming Spaces Conference, Darmstadt, 2002.

hypothesized that cell phone users would better adapt to the temporal disruption than usually accompanied the ubiquitous mobile communication, thinking, for example, that it is normal to answer their mobile phones while having an important meeting or break this meeting for calling home or talking to a passing friend. This result is consistent with Gillard's assertion that, by providing the opportunity for swift role switching without changing location, cell phones facilitate the harmonization of different role duties, because diachronic role change can be substituted by (almost) synchronous roles involvements, and because frictional costs associated with time-consuming locomotional activities can be avoided (Gillard 1996 quoted in Geser 2003).

Table 16. Time descriptors in mobile telephony usage. Mean answers on a five-point scale running from 1- definitely disagree with the statement to 5-definitely agree with the statement

	Heavy user (Base 76)			Not/light user (Base75)		
	Mean	Median	Std Dev	Mean	Median	Std Dev
I do things one after another	3.32	3.50	.99	3.51	4.00	.93
I generally stick to schedules and plans	3.85	4.00	.76	3.79	4.00	1.00
Family and social relations are more important than job	4.01	4.00	.98	3.77	4.00	1.06
I enjoy working in the presence of others*	<u>3.38</u>	3.00	1.01	2.91	3.00	1.01
I am often hurried and impatient	2.97	3.00	.99	2.90	3.00	1.11
One has to be always on time	4.16	4.00	.74	4.05	4.00	.90
I live in the present, I am not very interested in the past	3.22	3.25	1.17	2.95	3.00	1.08
I do often plans for the future	3.61	4.00	.81	3.43	3.50	.93

Note: *The Mann-Whitney test gave significant results (p 0.05)

Cross analysis by usage along gender; education; occupation; and the degree of experience with the medium outlined other differences between users and non-users (see tables 17-20). Within the male category, users felt slightly more future-oriented (*Ich mache oft Zukunftspläne*) than non-users (table 17). Female users scored higher than non-users on the polychronic issue: *I like to work in the presence of others*.

Table 17. Temporal perceptions. Cross analysis by usage within gender categories: Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

Gender		heavy user (Base 76)			not/light user (Base 75)		
		Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
Male	I often do plans for future*	<u>3.72</u>	4.00	.79	3.37	3.50	.95
Female	In enjoy working in the presence of other people*	<u>3.60</u>	3.50	1.00	2.93	3.00	1.11

Note: *The Mann-Whitney test gave significant results (p 0.05)

The usage variable interacted with some temporal perceptions in the higher education subsample (table 18), which was very well represented in the current study. Next to the aforementioned difference on the item, *I prefer to work in the presence of others*, higher-educated users tended to be more present-oriented than non-users.

Table 18. Temporal perceptions. Assessments of high educated respondents.

Higher educated (Base 66)	heavy user (Base 29)			not/light user (37)		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
I enjoy working in the presence of other people*	3.62	4.00	.98	3.09	3.00	.93
I live in the present, I am not very interested in the past **	3.57	4.00	1.06	2.93	3.00	.98
I often do plans for the future ^o	3.59	4.00	.69	3.27	3.00	.90

Note: Scale running from 1-definitely disagree with the statement to 5- definitely agree with the statement
The Mann-Whitney test gave significant results

^op 0.1

*p 0.05

**p 0.01

The fact that employed users enjoyed to work in the presence of others more than non-users might signify that they better adapted to a disrupted work environment, in which the tasks are accomplished in parallel temporal sequences (see table 19).

Table 19. Temporal perceptions. Cross analysis by usage within the employed sub-sample.

(Base 93)	heavy user (51)			not/light user (42)		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
I enjoy working in the presence of others*	3.51	3.50	1.01	2.96	3.00	.95
I often do plans for the future*	3.68	4.00	.77	3.36	3.50	.84

Note: Scale running from 1-definitely disagree with the statement to 5- definitely agree with the statement

*The Mann-Whitney test gave significant results p 0.05

Let's further explore the impact of usage experience within the user group (Table 20).

Table 20. Temporal perceptions. Cross analysis by the degree of experience- only users. Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

	Experience indicator for users (base 76)								
	Lower (Base 26)			Medium (Base 29)			Heavy (Base 21)		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
One should always be punctual *(low-medium) (low -high)	3.87	4.00	.74	4.34	4.00	.45	4.30	4.00	.91
I take schedules very seriously.* (low -high)	3.65	4.00	.75	3.84	4.00	.81	4.13	4.00	.55
Family and social relations are more important than job* (low-medium) (low -high)	4.27	4.50	.78	3.58	3.75	1.11	4.32	4.00	.80

Note: * The Kruskal Wallis test of difference among independent samples gave significant results p 0.05

Again, punctuality and the importance of family and social relations were differently assessed across the various usage categories. Medium-experienced users valued punctuality more than

newcomers. However, no difference occurred between medium and heavily experienced users. The very experienced ones definitely took schedules and plans more seriously than new users, with no difference in-between. Finally, it seemed that a higher experience with technology is accompanied by a higher importance attributed to family and social relations. An additional Component Principal Analysis has been performed to synthesize users' and non-users' perceptions of time. Three components resulted, explaining together 57% of total variance of the phenomenon.

Table 21. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.664	23.768	23.768	1.664	23.768	23.768	1.650	23.568	23.568
2	1.325	18.927	42.695	1.325	18.927	42.695	1.324	18.909	42.477
3	1.039	14.844	57.540	1.039	14.844	57.540	1.054	15.063	57.540
4	.950	13.566	71.106						
5	.889	12.697	83.802						
6	.622	8.884	92.687						
7	.512	7.313	100.000						

Note: Extraction Method: Principal Component Analysis.

The first component includes: tendency to do things one after another and importance of scheduling. It may define monochrony. The second characterizes the orientation towards the present moment and punctuality. The third component is mainly described by the polichronic temporal disruption encountered in work environments.

Table 22: Rotated Component Matrix(a)

	Component		
	1	2	3
I do things one after another	.785	-.069	-.100
I take schedules very seriously	.632	-.090	-.362
Family and social relations are more important than job	.763	.141	.334
I enjoy working in the presence of others	-.060	-.119	.815
One should always be punctual	-.005	.725	.273
I live in the present; I am not very interested in the past	.133	.709	-.163
I do often plans for the future	.172	-.498	.192

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 4 iterations.

In spite of the rather scattered general distribution of users and non-users in the field described by these components, there was a slight tendency of users to be more present-oriented than non-users. This fact is consonant with the ideas about the immediacy and simultaneity that characterize modern communication technologies usage.

As to the temporal spread of calls throughout the day, in the current study, mobile users employed the mobile phone particularly in the afternoon and in the evening.

Table 23. Temporal spread of calls throughout the day. Answers to the question: 2.9 *How much do you talk on the mobile phone in the morning, middays, in the afternoon, in the evening, nights?* (All calls add to 100%)

	Minimum %	Maximum %	Mean of procents
In the evening	10	90	37.44
In the afternoon	0	90	30.32
midday	0	50	14.45
mornings	0	40	10.74
during the night	0	60	6.99

This distribution emphasizes the private use of the technology and its after-work and personal nature. Although in its infancy mobile technology started as a professional tool, very adequate for an increasingly mobile and dynamic work environment, nowadays, it is deeply integrated into the daily life and into the user's self⁹³.

Availability, as another interesting aspect of time perception and experience, mixes in the overall temporal mobile frame and improves explanation: if desired, one can stay always available and share his/her time with the others. As Geser singled out: "cell phones usage tend to level out emotional oscillations in interpersonal relations: e.g., by making farewells less dramatic because we can always "keep in touch", and by dissipating the thrill and bliss connected with seeing each other again, because the void created by long absence has been filled with emails, cell phone calls, SMS and various other translocal communications" (Geser, 2003, pp.16-17). It should be recognized that the management of one's availability is a sensitive issue. If a mobile phone is powered up, it can always interfere with people's lives, enter their private sphere and confront them with the reassuring (or menacing) ringing. It is not always possible to decide when to call, and the ringing of the phone seems to exert some pressure to answer, making availability a burden. Usually, it is difficult to avoid communication, although some means to identify the caller or to listen to the message in the mailbox do exist. Nowadays, it seems that, rather than accessibility, the lack of it has become a luxury. This could be a way to prove someone's power and influence in the social life and to signal that a caller should pay much effort and do much searching to achieve his/her purposes. However, through the frame of functions and uses, users can generally prevent being exposed to the calls at all times and can maintain a certain control over their participation in communication. How do they do this? Some strategies are available and are already classified by Geser (2003):

- "by deciding when their mobile is turned on and turned off"
- by manipulating volume of voice
- by restricting the circle of people who possess the phone number
- by selectively filtering out "welcome" call numbers (so that all other callers hear the "busy sign" even if the mobile is turned on) (Bautsch et. al., 2001, quoted in Geser, 2003, p.15)

⁹³ Some studies confirmed this perspective. For example, as Kim (2002) has found out in a Korean study performed on users and non-users, mobile phone users and non-users showed significant differences in three out of four aspects of social behavior. Users of mobile phones were more active in getting together with their colleagues, participated more in **after-work** drinking occasions, considered life at work more important than private/family life, and tended to be more innovative.

Further:

- “By storing the numbers of incoming calls: allowing one to leave calls unanswered in the first place in order to respond to them later at a self-chosen point in time.
- By switching to text-based messages (SMS): thus leaving it to receivers whether and when to respond, and especially giving them time to design their response carefully, so that it mirrors their authentic and longer-term attitudes, rather than the impact of unpredictable momentaneous factors” (in Geser, 2003, p.15).

A seductive filtering scheme is further suggested by the author:

“In the future, we may well see phones which give users the capacity to signal their varying "coefficient of accessibility" (e.g. on a scale between zero and 100), so that callers can verify first to what degree a recipient is currently disposed to answer it (or even to get involved in a lengthier talk) (Geser, 2003, p.15)

All in all, it can be concluded that in spite of the rather unspectacular results concerning the relation between wireless technology usage and physical travel patterns (time spent and distances), the study revealed a consistent relation between the technology usage and the subjective perception of the effect of technology usage on travel, which proves the existence of the *communicative mobility* structure in the *dispositif*, but also points towards its immaturity. Although this is fully constituted at the cognitive-representational level of the subject, it is still deficient at the concrete level of the interactions in the *dispositif*.

With respect to the temporal frame, one structural effect of mobile usage has been highlighted: the usage of cell phones is characterized by a temporal disruption that accompanies the ubiquitous spatial structure of mobile communication. A mobile chronotype, characterized by disruption and fragmentation, has been highlighted. Yet, this temporal “*disposition*” appeared still to be weak. Next to the small statistical power of the current explorative study, I think that the problem resides in the fact that wireless technology usage is still at the beginning, and it needs time to induce changes in such basic structures like the perception and experience of time.

4.3.4. The Re-building of the User Frame: Images, Attitudes, Social Interaction

In this section, the analysis addresses the turning point of the arrangements in the *dispositif*-namely the subject frame. Focus will be placed on the study of attitudes, images about users and technology, and social interaction enabled by the *dispositif*.

4.3.4.1. Images and Attitudes towards Technology and its Users

Images and attitudes towards mobile technology and its users prove to be complex issues. The general image of mobile telephony is difficult to sketch since this technology is so rapidly changing. New functions and features are continuously added so that wireless telephony is never the same, having a fluid, changing face. Is the cell phone just a phone? Is it a wearable computer? Or, is it rather a part of the user’s body, which has recently grown from engineered flesh?

When we speak about representations, we are basically dealing with mental models. Generally speaking, these are occurrences, impressions and experiences that have been stored

as an inner image in the brain (Norman, 1983)⁹⁴. Humans understand things by categorizing and comparing them to similar, already existing, mental models. Mental models can be constructed from perception, imagination, or the comprehension of discourse (Byrne, 2000)⁹⁵. Representations and images about mobile telephony itself, its usage, and users could include visual images together with abstract ideas that cannot be visualized, feelings, and beliefs. These elements help to establish and to maintain interpersonal communication; furthermore, they influence the way users exploit the physical space when performing private or professional communicative tasks. Also, the attitudes of users and non-users towards technology and its usage are part of the subject frame in the *dispositif*. In the traditional view, the attitude represents a combination of cognitions, knowledge, affects and behavioral tendencies. However, the more recent definition is that attitudes are affective predispositions oriented towards the obtaining of a cognitive consistency.

The current study has revealed a consistent impact of the technology usage on various images and attitudes towards wireless telephony and its users. If the imagery of typical cell phone users across the two main sub-samples is analyzed, target consumers were perceived as active, hurried, and business-like persons. Non-users of mobile phones tended to construct a more "business-like" picture of characteristic consumers than the users in the sample. In addition, non-users considered mobile users to be annoying, a fact that will be discussed in detail in the next section. As expected, users in the sample favorably perceived their own group as active, business-like and modern.

Table 1. General images about cell phone users

	Heavy Users (Base 76)		Non-users (Base 75)		
	Count	Col %	Count	Col %	
Particularly suitable for active people**	disagree	14	26	29	51
	agree	40	74	28	49
Users better organize their daily life	disagree	46	92	53	90
	agree	4	8	6	10
Cell phone usage leads to success in everyday life	disagree	36	75	51	86
	agree	12	25	8	14
Users are modern	disagree	24	52	35	61
	agree	22	48	22	39
Usage suitable for businesspeople*	disagree	17	31	9	14
	agree	38	69	54	86

Note* The Chi-square statistic is significant at the p less than 0.05 level.

** The Chi-square statistic is significant at the p less than 0.01 level.

No typical age segment resulted from the analysis of respondents' imagery (Table 2). Both users and non-users believed that cell phones weren't particularly suitable for young and old people. This might contradict the general acceptance of teens as characteristic users. Nevertheless, many studies have recently indicated a continuous increase of the older age segments of users with the extensive domestication. The communication needs of the third age could be satisfactorily fulfilled by some new developments of the new wireless technology, such as: keeping in touch with the family members or with their friends, telematic medical supervising, emergency calls etc.

⁹⁴ Cited in Johnson-Laird, Phil and Ruth Byrne. May 2000, *Mental Models Website. A Gentle Introduction* (cited 3 November 2002). Available from World Wide Web:

http://www.tcd.ie/Psychology/Ruth_Byrne/mental_models/

⁹⁵ Ibidem.

Table 2. Answers to the dichotomous questions: mobile phones are particularly suitable for teenagers/old people

	Heavy Users (Base 76)		Non-users (Base 75)		
	Count	Col %	Count	Col %	
Particularly suitable for teenagers	disagree	34	71	45	76
	agree	14	29	14	24
Particularly suitable for old people	disagree	25	63	38	76
	agree	15	38	12	24

Other attitudes about technology and technology usage were examined (see table 3). It came out that more users than non-users agreed with the proximity impression while talking on mobile: *Am Handy scheinen sich große Distanzen, zu verringern. Man fühlt sich dem Partner näher.* Non-users tended to think that mobile phones were dangerous for health, significantly more than non-users did.

Table 3. Other attitudes about technology usage and devices

	Heavy Users (Base 76)		Non-users (Base 75)		
	Count	Col %	Count	Col %	
Closeness impression*	disagree	25	50	36	72
	agree	25	50	14	28
Technology dangerous for health**	disagree	32	68	14	33
	agree	15	32	29	67
Complicated, difficult to use devices	disagree	49	84	54	93
	agree	9	16	4	7

Note* The Chi-square statistic is significant at the p less than 0.05 level.

** The Chi-square statistic is significant at the p less than 0.01 level.

Cross analysis by usage within gender groups singled out rather different representations and attitudes of users and non-users. Male users agreed that mobile phones were suitable for active people more than male non-users did. On the contrary, male non-users believed that cell phone users seemed always in a hurry and that technology is dangerous for health more than male non-users did. Female users were more prone to notice a subtle effect of technology usage, such as the impression of closeness, than female non-users. They also recognized, to a greater extent, the suitability of the technology for communication with family members. Yet, female non-users agreed with a portrait of the typical user as always hurried and business-like, to a greater extent than female non-users. They perceived a higher risk of technology usage for health.

Table 4. Cross analysis by usage within gender groups

		Male (Base 99)				Female (Base 52)			
		Heavy Users		Non-users		Heavy Users		Non-users	
		Count	%	Count	%	Count	%	Count	%
Closeness impression	disagree	20	59	25	76	5	31	11	65
	agree	14	41	8	24	11	<u>69*</u>	6	35
Users are modern	disagree	16	55	22	61	8	47	13	62
	agree	13	45	14	39	9	53	8	38
Usage leads to success	disagree	25	74	34	87	11	79	17	85
	agree	9	26	5	13	3	21	3	15
Users are always hurried	disagree	26	76	17	47	14	93	3	14
	agree	8	24	19	<u>53*</u>	1	7	18	<u>86*</u>
Suitable for businesspeople	disagree	9	23	8	19	8	50	1	5
	agree	30	77	35	81	8	50	19	<u>95*</u>
Suitable for teenagers	disagree	23	70	34	85	11	73	11	58
	agree	10	30	6	15	4	27	8	42
Suitable for active people	disagree	10	27	19	51	4	24	10	50
	agree	27	<u>73*</u>	18	49	13	76	10	50
Dangerous for health	disagree	21	70	12	43	11	65	2	13
	agree	9	30	16	57**	6	35	13	<u>87*</u>
Complicated to use devices	disagree	35	85	36	90	14	82	18	100
	agree	6	15	4	10	3	18		
Users better organize their life	disagree	31	94	38	93	15	88	15	83
	agree	2	6	3	7	2	12	3	17
Particularly suitable for family communication	disagree	31	86	34	92	8	53	17	85
	agree	5	14	3	8	7	<u>47*</u>	3	15
Particularly suitable for business communication	disagree	24	73	20	59	10	63	10	
	disagree	9	27	14	41	6	38	7	
Particularly suitable for old people	agree	17	63	25	78	8	62	13	72
	disagree	10	37	7	22	5	38	5	28

Note* The Chi-square statistic is significant at p less than 0.05.

** The Chi-square statistic is significant at p less than 0.01.

Cross analysis by usage within age groups revealed that young users' dominant images about technology and their target consumers were generally positive - suitable for businessmen and businesswomen and for active people. Although some of these representations were shared by young non-users, too, almost half of the mobile users considered old persons to be a solid consumer group, while no young users shared this impression. Middle-aged users attributed a strong active feature to the mobile users, while non-users of the same category stressed the "hurried" nature of the target users and the environmental risk of the wireless technology. The same concerns were shared by older non-users, while older users came with rather strong positive representations of modern and successful users.

Table 5. Cross analysis by usage within age groups

	up to 27 (Base 50)				28-37 (Base 52)				38-65 (Base 49)				
	heavy users		non-users		heavy users		non-users		heavy users		non-users		
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	
Closeness impression	disagree	10	63	10	71	10	43	14	78	5	45	12	67
	agree	6	38	4	29	13	<u>57*</u>	4	22	6	55	6	33
Users are modern people	disagree	12	71	11	61	11	55	13	68	1	11	11	55
	agree	5	29	7	39	9	45	6	32	8	<u>89*</u>	9	45
Cell phone usage leads to success in everyday life	disagree	14	100	15	94	20	83	19	90	2	20	17	77
	agree			1	6	4	17	2	10	8	<u>80**</u>	5	23
Users are always hurried	disagree	11	73	7	41	21	84	7	37	8	89	6	29
	agree	4	27	10	59	4	16	12	<u>63**</u>	1	11	15	<u>71**</u>
Usage suitable for businessmen	disagree	5	29	3	14	7	26	2	10	5	45	4	18
	agree	12	71	18	86	20	74	18	90	6	55	18	82
Particularly suitable for teenagers	disagree	13	81	13	76	17	71	15	71	4	50	17	81
	agree	3	19	4	24	7	29	6	29	4	50	4	19
Particularly suitable for active people	disagree	4	27	7	39	6	22	13	68	4	33	9	45
	agree	11	73	11	61	21	<u>78**</u>	6	32	8	67	11	55
Technology dangerous for health	disagree	9	53	1	13	16	<u>76</u>	8	42	7	78	5	31
	agree	8	47	7	<u>88*</u>	5	24	11	<u>58*</u>	2	22	11	<u>69*</u>
Users better organize their daily life	disagree	17	100	16	94	21	84	18	86	8	100	19	90
	agree			1	6	4	16	3	14			2	10
Complicated, difficult to use devices	disagree	17	89	18	100	23	85	18	95	9	75	18	86
	agree	2	11			4	15	1	5	3	25	3	14
particularly suitable for family communication	disagree	9	64	17	89	23	88	17	94	7	64	17	85
	agree	5	36	2	11	3	12	1	6	4	36	3	15
particularly suitable for business communication	disagree	9	64	9	60	19	73	9	56	6	67	12	60
	agree	5	36	6	40	7	27	7	44	3	33	8	40
particularly suitable for old people	disagree	7	54	12	100	14	70	17	85	4	57	9	50
	agree	6	<u>46**</u>	0	0	6	30	3	15	3	43	9	50

Note* The Chi-square statistic is significant at p less than 0.05.

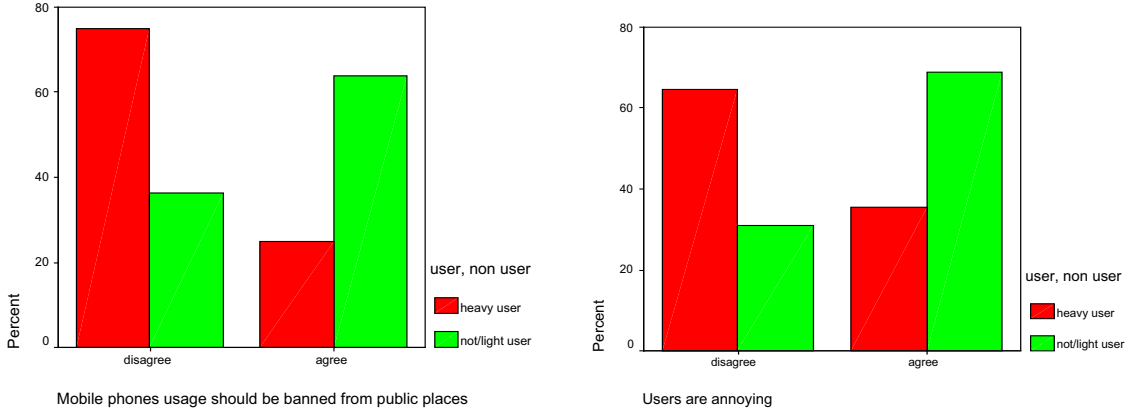
** The Chi-square statistic is significant at p less than 0.01.

4.3.4.2. Milestones of Rejection: Disturbance and Intrusion Effects

The question about whether or not mobile communication space in the *dispositif* interacts with the communicational spaces of other people has raised the interest of many researches of ICT's effects (Haddon, 2002). Is mobile communication disturbing for non-users? How strong is the public discomfort created by cell phone usage in the presence of other people? In the current study, statistical significant differences were revealed between user and non-user perceptions of two statements: *mobile users are annoying persons* and *mobile phones should not be used in public places where are people around*. More detailed, almost 2/3 of non-users (69%) agreed with the fact that mobile users were annoying, while only one third of users

(35%) thought this way. In the same manner, more than 60% of non-users felt that mobile phones should not be used in public places, while only a quarter of mobile users agreed with this statement. Thus, results indicated that non-users definitely did not want to participate in the private communicative space created by the mobile *dispositif* around mobile users and felt, at the same time, that their own shared space was in danger.

Figure 1. Perceptions of disturbance. Percentages of answers.



Note: For both statements the Chi-square statistic is significant at the 0.05 level.

Cross-analysis by gender revealed that the opinions of male users about mobile users as annoying persons were rather indeterminate, since half of them agreed and the other half disagreed with the statement (Table 6). Male non-users slightly agreed with the image of typical technology users as irritating persons. Yet, the difference between male users and non-users in terms of the low acceptance of mobile phones usage in public places was highly significant, with non-users’ reactions being more negative than those of the users. Female users significantly differed from female non-users in both statements and generally tended to be more disapproving about both issues.

Table 6. Disturbance effects . Cross analysis by usage within gender groups

		Male (Base 99)				Female (Base 52)			
		heavy users		non-users		heavy users		non-users	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Mobile users are annoying persons	disagree	17	53	14	37	14	88	4	20
	agree	15	47	24	63	2	12	16	80*
Mobile phones should not be used in public places	disagree	31	84	17	45	8	53	4	20
	agree	6	16	21	55*	7	47	16	80*

Note* The Chi-square statistic is significant at the 0.05 level.

Differences between male and female responses appeared only in the user subgroup (Table 7). Women’s responses proved more unfavorable about the usage of mobile phones in public places than men, while men manifested a lower acceptance of mobile users than the women of the same category.

Table 7. Disturbance effects . Cross analysis by gender within usage groups

		heavy users (Base 76)				non users (Base 75)			
		male		female		male		female	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Mobile users are annoying persons	disagree	17	53	14	88	14	37	4	20
	agree	15	47	2	12	24	63	16	80
Mobile phones should not be used in public places	disagree	31	84	8	53	17	45	4	20
	agree	6	16	7	47*	21	55	16	80

Note* The Chi-square statistic is significant at the 0.05 level

Cross analysis usage within age categories (see Table 8) revealed that older non-users tended to be more critical about mobile phone communicators and mobile conversation in public places than users and non-users of other ages. This confirms the fact that age plays a significant role in the social acceptance of the technology usage, in addition to gender.

Tabele 8. Disturbance effects . Cross analysis by usage groups within age categories

		up to 27 (Base 50)				28-37 (Base 52)				38-65 (Base 49)			
		user, non user		user, non user		user, non user		user, non user		user, non user		user, non user	
		heavy user		not/light user		heavy user		not/light user		heavy user		not/light user	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %
Mobile users are annoying persons	disagree	12	71	5	33	12	52	7	37	7	88	6	25
	agree	5	29	10	67*	11	48	12	63	1	12	18	75*
Mobile phones should not be used in public places	disagree	11	73	10	56	18	72	6	33	10	83	5	23
	agree	4	27	8	44	7	28	12	67*	2	17	17	77*

The disturbance effects identified by the study are not surprising at all. As Geser (2003) observed:

„...compared with reading newspapers or listening to Walkman music, mobile phones usage is a rather aggressive way of disengagement from the context, however, using, insofar as one’s own conversations are apt to disturb the privacy of others nearby, especially under conditions where the others are not able to withdraw (e.g. in restaurants or buses). Among colloquial interaction partners, answering cell phone calls can signal that they are not significant enough to deserve exclusive attention, or that the meeting is not considered important enough to shield oneself from incoming calls, and that EGO has acquaintances and role duties far more important than those momentarily present in the co local field. On the other hand, switching off the cell phone is a new way to show deference to present partners or to articulate the “dignity of the occasion”. One implication of this is that people may be more prone to tolerate the physical nearness of people with whom they have no (or negative) relationships, because the salience of such strains is reduced by the ever-present opportunity of “virtual emigration” (Geser, 2003).

4.3.4.3. Re-building of Social Interaction and Communicative Networks

Preferred Communication Partners

One important issue in the current study is to explore social interaction in the *dispositif*. Therefore, a special group of questions in the questionnaire aimed to characterize communicators and their interlocutors in mobile telephony; SMS; classical telephony and e-mail communication. Both users and non-users of mobile phones were asked to assess their communication partners in fixed phone conversation and e-mail. Partners in mobile communication (verbal and SMS) were subjects of the assessment of cell phone users only.

Table 9. Communication partners in mobile communication. Base 76 mobile users.

I call on mobile

Dichotomy label	Count	Pct of Responses	Pct of Cases
family	41	42	64
colleagues	17	18	27
friends	34	35	53
others	5	5	8
	-----	-----	-----
Total responses	97	100	152

I am called on mobile

Dichotomy label	Count	Pct of Responses	Pct of Cases
family	35	35	52
colleagues	25	25	37
friends	36	35	54
others	5	5	8
	-----	-----	-----
Total responses	101	100	151

Note: Multiple answers. Pct. of cases more than 100.

Overall, mobile conversation was oriented towards family members and friends, a fact that indicated the dominant private nature of usage. A light asymmetry manifested: respondents in the study tended to call family members but were equally called by family members and friends at their turn. The exchange of SMS messages typically occurred among friends. Almost a half of responses specified this fact.

Table 10. SMS communication partners. Base 76 mobile users only.

I send SMS to

Dichotomy label	Count	Pct of Responses	Pct of Cases
family	23	29	38
colleagues	15	19	25
friends	34	43	57
others	7	9	12
	-----	-----	-----
Total responses	79	100	132

I receive SMS from

Dichotomy label	Count	Pct of Responses	Pct of Cases
family	26	29	41
colleagues	14	16	22
friends	41	46	64
others	8	9	12
	-----	-----	-----
Total responses	89	100	139

Note: Multiple answers. Pct. of cases more than 100

Gender analysis within the user group showed that male respondents communicated on the mobile phone mainly with family members and friends, and the same partners called them at their turn. Communication appeared to be symmetric in this respect. Female users preferred to call family members on the cell phone. Friends emerged as second frequent partners. Yet, female users' answers produced no typical mobile "caller": family members, colleagues and friends equally called them. Male and female users believed that SMS was particularly suitable for communication between friends.

The partners in the competing forms of communication (e-mail and the fixed phone) were also explored in order to better understand the specificity of the social circle enabled by mobile communication. Family members emerged as preferred interlocutors in fixed phone communication. Second preferred partners were friends. It seemed that mobile users less often called friends and colleagues on the fixed phone than non-users did. They were also slightly less called by friends on the fixed phone than non-users were. Although the differences between the users and non-users groups were poorly significant, they pointed to the idea that the mobile phone might take over some of the communicative sociability of the fixed phone.

Table 11. Usual communication partners over the fixed phone.

		heavy users (base 76)			not/light (base 75)		
		Responses	Column Responses %	Column Responses % (Base: Count)	Responses	Column Responses %	Column Responses % (Base: Count)
I call on fix..	family	45	<u>50</u>	79	43	<u>41</u>	61
	colleagues	20	22	35	25	24	36
	friends	25	28	44	37	35*	53
	Total	90	100	158	105	100	150
I'm called on fix by...	family	45	<u>52</u>	79	48	<u>48</u>	70
	colleagues	17	20	30	18	18	26
	friends	24	28	42	34	34	49
	Total	86	100	151**	100	100	145**

Note : Multiple answers. Sum of column responses % over 100

*Chi-Square Tests*chi-square p=0.063

Overall, mobile users tended to employ e-mail in communication between friends and work-colleagues. Non-users were more likely to send and receive emails from friends than users did, but the difference was only slightly significant.

Table 12. Usual partners in e-mail communication.

		heavy user (base 76)			not/light user (base 75)		
		Responses	Column Responses %	Column Responses % (Base: Count)	Responses	Column Responses %	Column Responses % (Base: Count)
I send email to...	family	26	27	41	26	24	37
	colleagues	33	34	53	32	30	46
	friends	38	39	60	50	46*	71
	Total	97	100	154	108	100	154
I receive email from...	family	24	26	39	22	22	33
	colleagues	36	38	59	34	34	51
	friends	33	36	54	44	44	66
	Total	93	100	152	100	100	150

Note : *chi-square $p=0.070$

Cross analysis by gender within the users group (Table 60, 61 in Appendix) revealed that male users usually tended to call family members on the fixed telephone and to be called at their turn by family members. Preferred partners in e-mail communication were friends and colleagues. Female users also declared that they habitually called on the fixed telephone various family members. Nevertheless, they recognized that, usually, friends called them. Friends appeared to be also typical communication partners in e-mail communication of female users. Interestingly, many female responses designated another person (clients or professional contacts) as the characteristic e-mail sender. Differences between male and female users registered considering the receiving of e-mails from various persons.

Cross analysis by gender within the non-users group showed that male non-users considered family members and friends key communication partners in telephone and e-mail communication. Nevertheless, for female non-users, family members saliently emerged as typical partners in telephone conversation.

Differences between users and non-users occurred only in the male subgroup. On the one hand, male users tended to call family on the fixed phone more than male non-users. On the other hand, they called friends over the fixed phone less than non-users did. E-mail communication with friends (sending and receiving) appeared more typical for male non-users than users.

The conclusion of the analysis of gender is that, for male users, the fixed phone strengthens its character of a medium for family communication, losing at the same time some of its potential for sociability between friends. At the same time, non-users felt satisfied with the possibilities provided by the fixed phone and e-mail for the maintenance of social ties. All in all, it can be claimed that, for male mobile users, the mobile phone has gained in sociability potential with family members and friends, at the expense of other media like the fixed phone and the e-mail.

The next step was to investigate in the users group the impact of the age variable on the nature of partners in the studied communication forms (table 62, 63 in Appendix). When partners in other communication types (the fixed phone conversation and e-mail communication) were

explored, it came out that young users typically called family members and friends and were called by the same category of persons at their turn. Friends emerged as usual interlocutors in e-mail communication.

The majority of middle-aged users stated that they usually called family members on the fixed telephone and were called by family, too. Family members constituted frequent partners in e-mail communication as well, a fact that pointed towards the particular commitment for family of this age category. Finally, older users displayed a mixed pattern: they were also bent on family communication over the fixed telephone, but they tended to send e-mails to friends rather than to family. Some statistical differences between age categories were identified: middle-aged users called family members more often than those in other categories. Particularly, young users tended to be called by friends more frequently in comparison with other age categories. They also received e-mails from friends more often than the other categories. Mature users sent e-mails to friends less than the younger and older ones.

Let's explore now the non-users subgroup across age categories (Table 63). It resulted that young non-users called family and friends on the fixed phone and were typically called by family members. They tended to phone friends more frequently than their friends called them at their turn. For young non-users, e-mail communication took place most frequently between friends. Middle-aged non-users equally called family and friends on the fixed telephone, but they tended to be called most often by family. They usually sent e-mails to friends and received e-mails from friends and colleagues. Finally, older non-users phoned family and friends and were called most frequently by family. Friends emerged as preferred partners in e-mail communication among older non-users of mobile phones.

An interesting procedure would be to investigate whether or not mobile phone usage interacts with age in the assessment of various communication partners in fixed phone and e-mail communication. Table 13 displays the contingency coefficients and the asymptotic significances (2-sided) of Pearson chi-square for the significant associations between usage category (user, non-user) and the variables describing partners in each communication type within each age group. It can be observed that in the younger sub-sample, mobile telephony usage had a significant impact on communication with family over the fixed phone in the sense that users were less called on the telephone by family members and were reached instead by mobile calls.

Table 13 .Contingency⁹⁶ coefficients and asymp. Sig. (2-sided) of Pearson chi-square for the significant associations between usage category (user, non user), and the variables describing partners in each communication type, within each age group.

		young	mature
I'm called on fixed by...	family	0.359*P=0.008 more non-users than users	
I'm called on fixed by...	friends		0.416* Lambda = 0.417 P=0.001 more non-users than users
I send email to...	friends		0.331** P=0.012 more non-users than users
I receive email from...	friends		0.252° P=0.061 more non-users than users

⁹⁶ A measure of association based on chi-square. The value ranges between zero and 1, with zero indicating no association between the row and column variables and values close to 1 indicating a high degree of association between the variables. The maximum value possible depends on the number of rows and columns in a table. (cf. SPSS Help).

Mobile telephony usage had a more salient impact on communication partners within the mature group. Communication with friends over the fixed phone and e-mail seemed to interact with mobile telephony usage, meaning that less users than non-users employed these media to reach or to be reached by friends. Again, the mobile phone looked to gain some sociability potential from these media. (This “absorption” assumption was checked through the direct question addressed only to mobile users, about who their partners in mobile and SMS are.

It came out that young users tended, indeed, to call on the mobile phone **friends** and family members, and the same partners called them at their turn. SMS appeared to be used by young users particularly to communicate with **friends**. Middle-aged users exhibited almost the same pattern of partners in mobile conversation and SMS. Yet, older users communicated most frequently with **family members** on mobile phones, but family, friends and colleagues equally called them. Interestingly, family members emerged as preferred SMS communication partners for older people. In addition, they called colleagues more frequently on mobile phone than the other age categories. Difference was statistically significant.) However, if the contribution of various “partner” variables to mobile telephony usage was examined (using Lambda as directional measure with usage as dependent variable), it came out that only the fact of being typically called by friends on the fixed phone had a significant impact (Lambda = 0.417, p=0.019) within the mature group.

The analysis of user responses across experience with mobile telephony (see Table 64 in Appendix) indicated that higher-experienced users tended to call friends on the mobile phone more than the medium-experienced users. They also received SMS from friends more than the other categories.

Construction of Social Networks via Mobile Telephony Usage

Does mobile phone usage strengthen the ties between peoples or relax them?

One of the study hypotheses was mobile telephony usage structures social interaction by enabling social network maintenance, contact keeping, and community building. Ling and Yttri (2001) discovered that particularly teenagers thrived on access and interaction and enjoyed the separate communication channel that technology provides. For them, cell phone messages represent a confirmation of one’s membership in a group (also in-group definition and control of group boundaries), a social network being thus built inside the mobile system. Consequently, in this study, it is generally expected that mobile phone usage make users feel they become more connected (as before) with people who share their hobbies/recreational activities and people in their profession. It is also presumed that mobile telephony structures the presentation of self⁹⁷, a very important element in communication (importance of a small, new, and not very visible device--the culture of the concealed use). This idea comes closer to the expressive use of the device to communicate emotional preferences as opposed to more task-orientated information (Ling, Yttri, 2001).

⁹⁷ Mobile phones can also contribute to the strategy of individuals to defend a minimal private space and the right to enjoy “civil inattention” within areas densely populated with - potentially intruding and irritating - unknown strangers (Haddon 2000; Cooper 2000). As Goffman has remarked, women especially often don’t like to show themselves alone in public places, because this may indicate that they are without relationship: a condition which (1) provides a bad impression of their social status and (2) leaves them in an unprotected situation which is often exploited by foreign males. For mitigating these consequences, the cell phone is quite useful, because it can carry the message: I’m physically alone, but not isolate and alone, because I’m still embedded in my social setting. (Plant, 2000 quoted in Geser).

A related issue is whether or not the mobile phone usage leads to the aggregation of social groups in the physical space (meetings, drinks, etc) or rather promotes a virtual sociability in which technology connections are performed in sound-mediated “rooms”. Some studies have tried to address this problem and have provided interesting answers. For instance, Roderick singled out that mobile phones in public space:

“do not necessarily signal the disaggregation of the crowd but rather merely serve as one more example of sociation through relations between human and non-human actors. The very possibility of mobile phone *flânerie* suggests that instead of mobilising private lives, consumers of wireless communications technologies are mobilising forms of sociation which remain group-centred, even if these groupings are more trivial, minuscule and fragile than those that we might attribute to pre-industrial and premodern society.”⁹⁸

Also, as Kim has found out in a Korean study performed on users and non-users, mobile phone users and non-users show significant differences in three out of four aspects of social behavior: users of mobile phones were more active in getting together with their colleagues; participated more in after-work drinking occasions; considered life at work more important than private/family life; and tended to be more innovative. The author recognized the difficulty to say whether or not users are more collective and hierarchical than non-users, but he felt sure to assert that they certainly tend to be active in maintaining social relations at the cost of their private time. He named them “a collective group with a collective orientation, acquired over a rather long time period through various stages of socialization” (Kim, 2002.)

In the current study, the procedure to address the “aggregation effect” was to directly assess the agreement of respondents with two items of sociability building, which were collected from open-ended questions in the pre-test phase:

- *Mobile phone users tend to have a larger group of friends than non-users-pointing to the extension of close relationships*
- *The usage of the mobile phone help connecting people – mainly describing the peripheral side of the social networks (just connects instead of building relationships*

Both mobile users and non-users disagreed with the fact that mobile telephony usage could enlarge the circle of friends by itself. No differences between sub-samples were found. However, almost half of user respondents believed that mobile telephony usage strengthened social relations, while only a quarter of non-users felt that way. Difference between users and non-users was statistically significant at p less than 0.05 (see Table 14).

Table 14. Direct opinions about the influence of mobile usage on sociability

		heavy user		not/light user	
		Count	Column %	Count	Column %
Handybenutzer haben mehr Freunde als die Nicht-Benutzer	disagree	38	83	51	90
	agree	8	17	6	10
Das Handy bringt Leute zusammen	disagree	23	51	38	73
	agree	22	49*	14	27

Note *The Chi-square statistic is significant at p less than 0.05

⁹⁸ In, *Mobility and Audibility*: Ian Roderick, Presented to the Canadian Sociology & Anthropology Association Annual Meetings, 2001.

All in all, it seems that mobile telephony usage may have a complex effect on the construction of social relations. On the one hand, verbal and SMS communication have emerged as good means to preserve the primary social contacts among family members or among peers with the same demographical characteristics or life-styles. On the other hand, respondents did not feel that technology usage had the power to enlarge their inner social groups based on friendship. Instead, this could be able to extend the social network of acquaintances by enabling superficial contacts among the various knots of the social network.

5. CONCLUSIONS

5.1. Answers to the Research Questions

The thesis has focused on wireless telephony usage patterns and has aimed to understand the complex relationship among specific constraints and facilities of this technology, users, actions and perceptions, and particular social and cultural frames of our time.

The following questions have been asked:

5.1.1. Does Mobile Telephony Usage Lead to a Structure Re-build of Communication, Information and Movement?

The thesis has given a positive answer to this question and has tried to clarify this possibility. Following a general orientation of the Darmstadt School, “Technification and Society”, the re-building of communication movement and information structures due to the integration of the wireless telephony in the daily life has been explained through the concept of *dispositif*. In the tradition of media *dispositives*, the *dispositif* of wireless telephony has been conceived as a network of miscellaneous elements, with formative powers. Its components are not chaotically arranged, but certain strategies unify them to re-build intertwined patterns of communication; information; supervising; entertainment; and spatio-temporal behavior. *Mobile communication* and information and *communicative mobility* emerge as main “arrangements” of the current wireless telephony *dispositif*.

To illustrate these ideas, a model has been constructed, comprising specific elements and frames. The spiral-type interaction among the apparatus (devices, technical infrastructure), human subjects, and usage programs is influenced by the particularities of the social and cultural frame and by a general ordering principle (the wireless networking), which is at the same time material (the “cellular” spatial architecture) and representational (the mental mobile space). Social frames include institutions; regulation; types of social networking; discourses; ideologies; and communication culture. Decisive for defining mobile telephony shaping and usage are the networked society (Castells, 1996), the rule of perpetual contact (Katz & Aakhus 2002), and the flexibilization of work and private spheres. The second ordering frame - the wireless networking - releases the usage from the strong spatial and temporal dependence and influences all the other further components of the *dispositif*.

The apparatus as the material core of the *dispositif* provides users with devices and architecture that filter and structure interaction and communication, according to specific usage programs. The human element as user and developer designs and re-designs the usage combining motivations; needs; expectations; and representations with the more rigid possibilities of the apparatus. The interaction of elements and frames in the *dispositif* leads to the re-building of communication, information and movement patterns.

The *dispositif* features an interesting dynamic, behaving like a living body oriented towards continuous reorganization rather than stability and equilibrium. With deeper technology domestication, the accomplishment of “programs” further conditions humans’ reactions and wishes, both from the perspective of users and designers. Communication, information,

entertainment and supervising structures are re-built and rearranged according to the new circumstances. Their modification has further reverberations at the social and economical levels, inducing a temporary readjustment of the technical apparatus. Humans react by promoting or adapting the programs. The spiral grows and grows and further affects elements of culture and society, perception and experience of space and time, and social relations.

The *dispositif* approach constitutes a flexible explanatory alternative, which avoids many disadvantages of both structuration theory and technological determinism. In what way is this accomplished? The technical determination of human actions is balanced by the strong intrusion of the social dimension in technical elements and processes. For instance, despite the fact that the spatial infrastructure and the applications in mobile devices allow only a restricted palette of uses, human actors as components of the social sphere in the *dispositif* are able to re-build and modify technical relations and elements. The creative actions of mobile users, marketers, and engineers can manifest at various levels through invention and introduction of new and, sometimes, surprising programs and applications. For instance, in the beginning, wireless communication technology was solely a radiotelephony dedicated to transmission of orders and coordination and, later, to interpersonal communication. Nowadays, various uses and niches are opened, making technology more and more indeterminate and complex. The strong social determinism is also corrected by the acknowledging of a certain degree of influence from the part of technical frames to the constitution of usage programs.

5.1.2. How Has the Dispositif Been Developing?

The development of wireless communication technology presented in the historical chapter of the thesis displayed how the *dispositif* has gained in consistency and organization. The thesis supports the idea that the current mobile telephony represents a functional phase of a manifold *dispositif*, which has been historically constituted through redefinition and creative rebuilding of programs and structures belonging to earlier avatar *dispositives* (variant phases or versions of the *dispositif*) and competing *dispositives*.

In the development of cellular telephony and the corresponding *dispositif*, avatars of communication and communicative mobility structures have been presented, in connection with the underlying routes from science to technical implementation. Several phases have been singled out, in order to emphasize the events that created delays or impulses--turning points. They should be understood only as conditions for the crystallization of a given element in the *dispositif*: first, the wireless transmission of voice; then, the constitution of the cellular system and of portable devices which enabled the real communicative mobility; and, finally, the digital integration of voice and data, which allowed the whole range of possible usage programs in the *dispositif*.

5.1.3. How are Mobile Communication, Information, and Communicative Mobility Rebuilt within the Dispositif?

This question has been answered with the help of an explorative empirical study conducted in 2002. The quantitative study was designed as a variant of a post-factum experiment in natural environment (case-control study). Users and non-users of mobile phones between 13-65 years constituted the target population. A total sample of 151 respondents (76 users and 75 non-users) was selected for analysis. User and non-user samples were matched according to some

socio-demographic variables like age, gender, and education, in order to isolate the impact on usage on various dimensions of mobile communication.

The study was carried out with two main purposes:

- To validate and correct the theoretical model of the mobile *dispositif*-the existence of the inner elements and frames and the nature of the relations among them
- To explore the formative effects of the *dispositif* on the interrelated communication, movement, orientation, and localization patterns

To validate the model, a Principal Component Procedure was performed to show how the internal usage structure of the main applications and functions in mobile telephony has led to the constitution of specific usage programs. From the analysis of the usage of various applications of mobile telephony, six (6) components resulted, explaining together almost ¾ of total variation (68%). The remaining unexplained variation was due to new value-added functions less used, but with great potential in the future, like: Location Based Services, Guardian services, and MMS.

Table 1. Principal component analysis. Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative Total %	Total	% of Variance	Cumulative Total %	Total	% of Variance	Cumulative Total %
1	5.831	27.767	27.767	5.831	27.767	27.767	3.266	15.550	15.550
2	2.782	13.250	41.017	2.782	13.250	41.017	2.974	14.164	29.714
3	1.693	8.062	49.078	1.693	8.062	49.078	2.897	13.794	43.508
4	1.626	7.741	56.819	1.626	7.741	56.819	2.085	9.926	53.434
5	1.232	5.868	62.687	1.232	5.868	62.687	1.556	7.407	60.841
6	1.020	4.858	67.545	1.020	4.858	67.545	1.408	6.703	67.545

The analysis generally confirmed the existence of the main groups of applications that sustained the main programs of the *dispositif*:

- *Component 1*: Application group for **the mobile office program: PDA – Agenda frame**: Calendar and Agenda, Clock, Calculator
- *Component 2*: Applications group for **navigation and orientation**: Wireless Internet, Email on the Internet
- *Component 3*: Application group for **mobile communication**: Verbal and SMS, Phone directory, last calls, and Vibrate mode
- *Component 4*: Application group for **the management of personal availability**: Mobilbox, Call forwarding
- *Component 5*: Applications for **the music program**: Mp3 Player and key lock – signaling the transformation of the mobile communication device into a music device
- *Component 6*: Application for the **Games program**

The Rotated Component Matrix looked as follows:

Table 2. The rotated component matrix

Component	1 Mobile office	2. Information and orientation	3. Mobile communication	4. Availability management	5. Music	6. Games
Verbal communication	7.145E-02	2.949E-02	.648	.386	.235	6.619E-02
Mailbox	-8.611E-02	.306	.219	.582	3.842E-02	-.259
SMS	.241	-3.978E-02	.552	-9.027E-02	.278	.202
Phone directory	.455	6.606E-02	.573	.254	.173	-.200
Clock	.630	.158	.241	-3.698E-02	.306	-.244
Ring tones	.535	-2.359E-02	.224	.499	-7.744E-02	.286
Redial	.295	8.485E-02	.738	.190	-.144	-.117
Calendar	.863	.157	8.815E-02	6.986E-02	-4.499E-02	7.982E-02
Agenda	.766	.265	8.950E-02	.167	2.070E-02	.131
Last calls	.477	.103	.489	.325	-1.858E-02	-3.300E-02
Vibrate mode	4.552E-02	.170	.748	-.134	-4.361E-02	.249
Key-lock	.138	-.144	.259	-3.576E-02	.726	-.143
Calculator	.698	-8.193E-02	.287	-.221	-4.064E-02	.247
Internet	.226	.721	-.142	.221	8.254E-02	4.069E-02
Data transfer	-1.644E-02	.791	.279	9.521E-03	.245	-1.547E-02
E-mail on the Internet	.105	.761	.166	.138	5.058E-02	7.294E-02
Games	.186	.143	.172	-8.451E-03	9.295E-02	.832
Mp3 player	-.108	.249	-.142	-4.914E-03	.709	.317
Call forwarding	.116	.215	1.284E-02	.843	-4.146E-02	2.646E-02
Multi-party calls		.503	4.102E-02	.485	-.268	.360
Navigation	.164	.757	-1.972E-02	.132	-.288	5.812E-02

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Next to the supporting applications - contribution of technical frames - the programs are also defined by transported contents, part of the subject frame in the *dispositif*. From the empirical analysis of the content, it resulted that mobile communication served two distinct purposes: 1- to socialize with others and to express oneself and 2 - to coordinate the daily agenda and movement. Therefore, the component 3 (mobile communication) needs to be newly interpreted and extended in the light of the qualitative information extracted from the analysis of communication content. There is one type of mobile communication corresponding to un-referential conversation (chatting) and another dedicated to spatial and temporal management, which can be united with component 2 (information and orientation). For better clarity of the model, some other components defining entertaining actions can be grouped, too. In addition, the empirical evidence of the existence of the component 4 pointed towards the constitution of an important frame in the *dispositif* dealing with the management of one's availability. The model can be corrected accordingly.

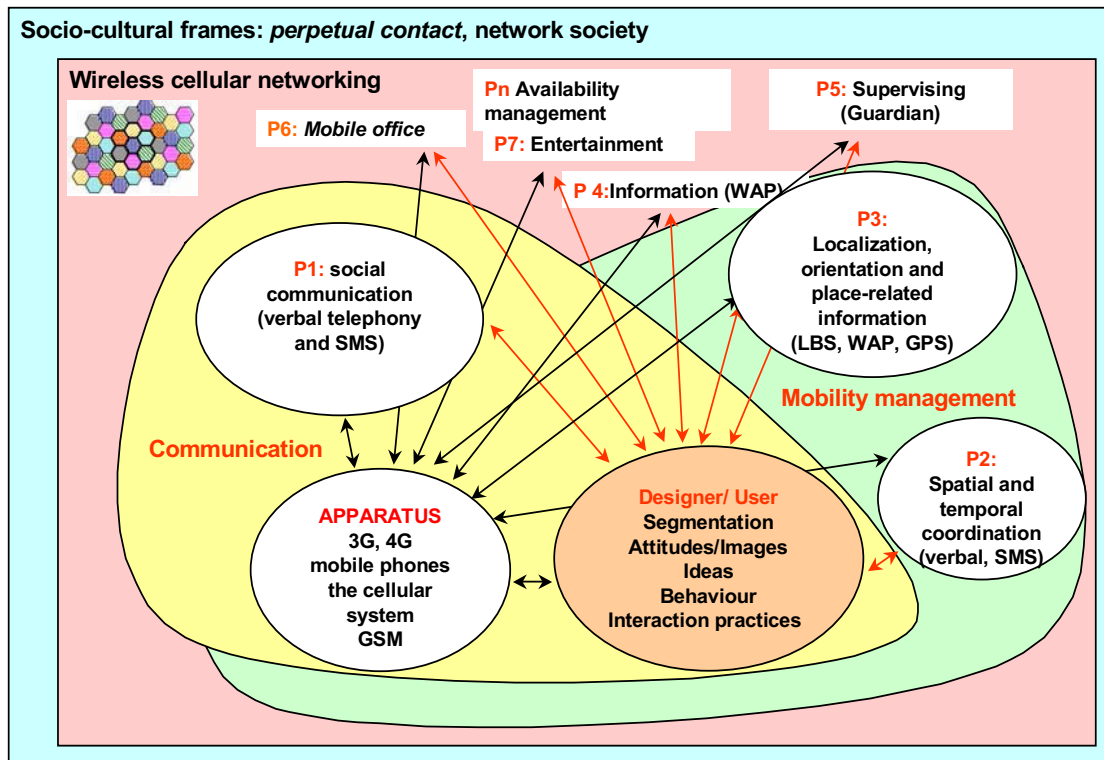


Figure 1. The corrected model

Although the wireless *dispositif* model features nowadays a considerable complexity, only the constitution of **mobile communication** and **communicative/informative mobility** could be thoroughly examined at the date the study was conducted. 3G mobile phones with enhanced Internet, navigation and video capabilities hadn't massively diffused yet. Therefore, the most frequently used functions in our study were: verbal telephony; key-lock; the phonebook; vibration modus; clock and SMS. The wireless Internet and advanced services like MMS and Location-based services did not appear among the most frequently used applications.

The interdependencies and formative effects within the *dispositif* were analyzed with the help of two strategies:

- Results obtained from user and non-users sub-samples were compared in order to highlight the formative effects of the usage on the constitution of various communicative and behavioral patterns (movement, social interaction).
- Correlations and cross tabulations (for categorical variables) were employed to highlight the association between elements and frames.

Analysis showed that wireless communication technology produced a distinct type of communication structure in terms of purposes; content; communicative situations; actions and partners. *Mobile communication* was positioned as the farthest from the untechnicized structure--the face-to-face dialogue. Far from being purely talkative and entertaining, the new "arrangement" could be best defined by the concept of short contact, either sociable/coordinative. The ratio sociable/coordinative communication depended on a variety of factors. When the present study was conducted, the dominance of a communication

oriented towards coordination of temporal and spatial agenda could be highlighted. In particular, mobile users attributed to the mobile phone a strong coordinative function (coordination of the daily agenda, risk management, or instant problem solving) to a background of a rather poor “chatty” potential. As expected, SMS proved to be particularly appropriate for communicating short information. Differences in the way that mobile phone users and non-users perceived the suitability of mobile conversation and SMS for a given range of communicative actions/situations were identified. Users attributed to the mobile phone conversation a stronger instrumental value (coordination of the daily agenda, risk management, or instant problem solving) to the background of a poorer potential of entertainment. On the contrary, non-users considered that the fixed phone and e-mail had these characteristics. Users in the sample were more aware of the potential of SMS for sociability maintenance and coordination.

Results also revealed that *mobile communication* has been constituted in interaction with other concurrent or complementary structures. The *dispositif* managed to “arrange “them by ingeniously manipulating their suitability for competitive purposes. More specifically, among the competitive media, the fixed phone and e-mail on the Internet brought the most important contribution to the explanation of mobile telephony usage. For instance, a strong disagreement with the particular suitability of the fixed phone for some coordinative actions like *canceling of schedules; calling in emergency; reassuring the family or short contact actions* (communicating short news) participated in the explanations of mobile phone usage. In the same manner, a disagreement with the fact that e-mail on the Internet was particularly suitable *to talk about music; films; to ask what’s new; and to communicate short information* helped in predicting mobile telephony usage.

Another issue related to the constitution of the mobile communication structure in the *dispositif* concerned the affective reactions to communication during and following cell phone usage. Results indicated that informal mobile conversation was associated with mixed positive and negative reactions, such as liberty and enjoyment, but also stress, (chaos or “hecticness”) and coercion. The comparative analysis of affective reactions associated with face-to-face communication, mobile telephony, classical telephony, e-mail and letters⁹⁹ also singled out some particularities of the positioning of wireless technology usage in the informal affective setting. The profile of mobile telephony perceived by users falls into the same category with non-users’ reactions to the classical telephone conversations. On the contrary, users’ reactions associated with fixed phone communication were definitely different from reactions to mobile conversation, being closer to the group of the other media: e-mail and letters. It resulted that wireless telephony usage also readjusted the construction of the affective field of other communication media and forms in underlying competitive dispositives. In particular, mobile users perceived e-mail communication as being less free and under more temporal pressure than non-users. Also, they regarded telephone conversation as less hectic and stressful in comparison with the more hectic and tensed wireless conversation. Interesting results concerned direct communication (face-to-face). Mobile users felt a gain in the comprehension of face-to-face messages in comparison with non-users. In addition, direct contacts appeared for them to be less hectic and stressful than for non-users. These adjustments might derive from a comparative action that users performed in their daily life among various media, which resulted in the more salient definition of wireless communication as hectic and stressful and in a relaxation of such characterizations for direct communication.

⁹⁹ Resulted from the Multidimensional Scaling of media perceptions in the affective field.

In the formal setting (the work sphere), mobile phone usage was mainly associated with stress, hurriedness, and some mild unpleasant expectations.

5.1.4. What type of spatial and temporal behavior (mobility, localization) associates with mobile communication?

This question mainly addressed the constitution of *communicative mobility* structure in the *dispositif*.

The construction and exploitation of the mobile communication space proves to be a complex and difficult issue. It is challenging to explore whether or not the heavy mobile telephony usage leads to an increase or decrease in physical mobility and, vice-versa, whether changes in mobility affect wireless technology consumption. Since the current study had only exploratory purposes, no causal explanation but only meaningful associations between travel behavior, calling locations and wireless technology usage could be highlighted. Extensive quantitative studies are needed to clarify the direction of influence. Although few differences between users and non-users were identified, it seemed that particularly the relation between the duration of irregular business travel and the usage of mobile telephony was significant. In what concerns travel distances, a heavy usage of mobile telephony was associated with an increased remote mobility. The near spatial mobility (the travel in the neighboring areas) remained unaffected. By providing both reassurance and information, mobile phones may prove to be useful to remotely control the daily agenda.

In spite of the rather unspectacular results about the relation between wireless technology usage and the physical travel patterns (time spent and distances), the study singled out a consistent subjective perception of the effect of technology usage on travel. A significant number of users of cell phones in the study asserted that their mobile calls, either sent or received, had an important effect on their mobility in the physical space. This effect mainly consisted in the modification of a previously established route and demonstrated the intrusion of the technology in the daily planning, through the additional information provided by the call. The second important effect, travel saving, signaled an availability of mobile users to solve their daily problems over the virtual route provided by wireless telephony, even in the absence of direct contacts.

Concerning the localization component of the mobility frame, results showed that mobile conversation usually took place in various mobile locations - outdoors, from cars or on the streets or from stores of the city. However, fixed places, like the own house or the office, proved to be also important locations to engage in a more lengthy and comfortable call. The existence of places invested with social meanings, traversed by communication flows, can be advocated.

Temporal “arrangements” in the *dispositif* also represented subjects of the analysis in the thesis. Orientations towards past, present, and future, as well as the positioning on the axis monochrony-polychrony have been investigated. It came out that higher-educated and employed users tended to be more present-and-future-oriented. The results also revealed that cell phone users might better adapt to the temporal disruption that accompanied the ubiquitous mobile communication. One clue in this matter could be the fact that users statistically differed from non-users in terms of the item, *I prefer to work in the presence of others*, an item describing fragmentation and parallel task fulfillment associated with a polychronous experience.

5.1.5. How do Communication and Mobility Intertwine in the Dispositif?

Correlations and cross-tabulations were performed to illustrate the collaboration of the elements and frames in the *dispositif* to the construction of the interlaced communication/mobility structures. For instance, regarding the intertwining of communication and mobility frames, a high frequency of verbal mobile communication was positively correlated with the perception of one's increased mobility in space (Table 3).

Table 3. Example of the intertwining of communication and mobility frame. Correlation between the frequency of verbal mobile communication and the item: *I am increasingly mobile, I travel more than before*.

	I am increasingly mobile, I travel more than before (5 point scale)	
Frequency of verbal mobile communication (5 point scale)	Pearson's Correlation Coefficient	.249
	Sig. (2-tailed)	.031

Note: * Correlation is significant at the .05 level (2-tailed).

In Table 4, significant correlation coefficients between the mobility dimension and various components of the *menu* frame (usage programs) are presented. It can be noticed that the amount of irregular professional business travel was significantly correlated with the frequency of usage of e-mail on the wireless Internet and multi-party calls. In a consistent manner, a frequent remote mobility (travel within the country) was associated with an increased usage of the wireless Internet and of e-mail on WAP. The mobile cyberspace emerged, thus, as a powerful instrument to sustain this kind of mobility, rather than verbal communication. This association may also hide the need to gain certainty and to obtain information about new places through context awareness services, which remain at the basis of orientation programs in the *dispositif*. On the contrary, higher frequency of travel within the city correlated with a heavier usage of Mobilbox and phone directory. These functions facilitated the management of social relations in the vicinity, meetings, meeting points, etc.

Table 4. Intertwining of the mobility frame with the programme frames. Pearson's Correlation Coefficients

Mobility Subjective	Irregular business travel (in hours)	Other private travel (in days)	Frequency of travel in the same city (5 point scales)	Frequency of travel in <i>Bundesland</i> (5 point scales)	Frequency of travel within the country (5 point scales)
Mobil box			0.318*		
Phone book/Directory			0.377*		
Internet					0.433*
E-mail Internet	0.365*				0.429*
Konferenz	0.255**				
I travel more than before	0.332**	-0.279*			

Note: * The correlation is significant at the .05 level (2-tailed).

** The correlation is significant at the .01 level (2-tailed).

If temporal elements are introduced into analysis¹⁰⁰ (Table 5), the irregular business travel was associated with a high importance attributed to schedules, and with the perception of the own increased mobility in time. The amount of private travel was positively correlated with polichrony (doing things in parallel), but proved to be negatively associated with the importance attributed to family relations, and with the perception of an increased mobility in time. Also, monochrony was negatively correlated with the amount of travel within the country, which was significantly linked to the tendency to make plans for the future at its turn.

Table 5. Interaction of the mobility frame with temporal perceptions. Pearson's correlation coefficients

Mobility \ Temporal perceptions	Irregular business travel (in hours)	Other private travel (in days)	Frequency of travel in the same city	Frequency of travel in <i>Bundesland</i>	Frequency of travel within the country
Takes schedules seriously	0.252*				
I do things one after another		-0.251*		-0.293*	
I do often plans for the future					0.268*
Family and social relations more important than job		-0.245*			

Note: * The correlation is significant at the .05 level (2-tailed).

** The correlation is significant at the .01 level (2-tailed).

The interaction of time experience with communication locations and partners produced some interesting output that helped defining the way the *dispositif* structures users communication and behavior. The tables below display the Lambda coefficients and the asymptotic significance (2-sided) of Pearson chi-square for the associations between temporal variables on the one hand and communication places and partners on the other hand.

Table 6. Interaction between perceptions of one's mobility and orientation and communication places (Localization)

	Fix place to conduct communication	Mobile place to conduct communication
	At the office	In the city, downtown
I live in the present		0.207 (p=0.072)
I take schedules very seriously	0.333 (p=0.034)	
I often make plans for the future	0.212 (p=0.038)	

Note: Each cell indicates the result of cross tabs (Pearson chi-square test) between the dichotomous variables (places to communicate mobile) and the scale variables. Lambda coefficients¹⁰¹ and asymp. Sig. (2-sided) of Pearson Chi-Square are shown for the significant differences only.

It came out that office as a fixed calling location was best associated with the tendency to make schedules and to make plans, while the propensity to call from outdoor locations (from the city) was correlated with the orientation of respondents towards the present time.

5.1.6. What Type of Social Interaction Manifests with Wireless Telephony Usage?

The majority of users acknowledged an important effect of the *dispositif* - that technology usage helped maintaining close interpersonal contacts with family members and friends. For

¹⁰⁰ I should recognize that the values of the correlations coefficients are practically small and a larger study is needed to certify their existence.

¹⁰¹ A measure of association which reflects the proportional reduction in error when values of the independent variable are used to predict values of the dependent variable. A value of 1 means that the independent variable perfectly predicts the dependent variable.

this purpose, keep-in-touch functions mixed with applications for supervising purposes. In addition, wireless telephony proved to be useful to manage or to enlarge the social circle of acquaintances through applications like phone directory or last calls. This finding was in tune with previous studies conducted on sociability and mobile telephony that emphasized the technology importance for the extension of the peripheral part of the social network (see Geser, 2003).

Users should, however, wisely act on parallel front-stages in order to avoid the *almost visceral reaction* of non-users to the inappropriate use of mobile telephones in their public space. Non-user respondents sanctioned those who used mobile telephones in their vicinity, considering them annoying persons and claiming that cell phones usage should be banned from public spaces. It is true that the current study measured only the general acceptance of the technology usage and users. Nevertheless, extensive studies were published that detailed the various social settings where the usage of mobile phones was considered inappropriate.

5.1.7. What are the Main Images and Attitudes towards Technology and its Users?

The answer to this research question draws the portrait of the constituted user and usage constructed within the *dispositif*. Both types of respondents believed that target users were active and efficient. However, non-users tended to see typical consumers as hurried persons and to consider cell phones mainly business tools. Possible sources of this perception could be the initial positioning of the cell phone on the market as a business tool in the 90's (which reverberations have not vanished yet); the incomplete awareness of the possible range of private uses; and a general low acceptance of modern communication technologies. Their opinions significantly differed from those of users in this matter. With technology adoption and domestication, wireless telephony was accepted in the private sphere as a useful tool for family communication.

In conclusion, the empirical results succeeded in validating the *dispositif* model and correcting it. Moreover, the associative analysis confirmed the collaboration of the elements and frames of the *dispositif* to the production of new communicative and behavioral structures.

5.2. Limitations Affecting the Results of the Empirical Study - Methodological Discussion

General limitations

Because the wireless communication technology has advanced at a fast pace, some of its applications (Multimedia Services, Localization, and Guardian Services) could not be included in the empirical study at the date this was conducted. However, their potential has been theoretically explored (see chapters 2.1 and 2.2).

Limitations of the study design

When designing the study, I started from the desire to establish the existence of changes in communication and mobility practices and to investigate their causes. The initial idea was to show how mobile telephony structured communication and spatial mobility. A kind of

longitudinal approach would have been suitable to isolate these changes. However, large and lengthy studies might have been required to give adequate statistical power. It is also true that an experiment would have been the best design for causal inferences. However, in practice, it is very difficult to manipulate such a variable as mobile telephony usage. An example of variable manipulation would have been to give mobile phones to the non-users for several months' usage, after performing randomized assignment of (only) non-users to the experimental groups. Also, it would have been possible to construct a quasi-experimental design with two non-randomized groups, but at least several repeated observations for each group before and after variable introduction would have been necessary for a satisfactory experimental validity. Time and cost constraints made this type of experimental design non-applicable. In this situation, the case-referent design, with its matched sub-samples of users and non-users, could satisfactorily isolate the effects of technology usage on several variables. Matching meant that users' and non-users' samples were purposely selected to be very similar with respect to some controlled socio-demographical characteristics. Indeed, difference tests didn't reveal any significant difference between these sub-samples in terms of age, gender, and education. A satisfactory matching in terms of working status was also achieved.

A desired matching variable would have been also the income level, but, unfortunately, subjects misunderstood the income question and gave either unreliable answers or no answers at all. Consequently, the combination of answers to education and occupation (pre-coded and open-ended) items was employed to establish the social status of the interviewed person and to construct the samples.

Differences between user and non-user sub-samples concerning various *dispositif* dimensions were highlighted. These offered reliable evidence about the impact of the wireless technology. However, in several cases, due to data restrictions, the study was unable to provide causal explanations for certain situations (for instance—that increased travel was truly responsible for heavy usage of verbal mobile telephony, SMS communication, or wireless Internet). The influence of other unmatched variables had to be taken into consideration in analysis.

In this situation, the associative approach could constitute a satisfactory solution for the highlighting of the elements and frames of the *dispositif* and the identification of their interaction. Several correlations and crosstabs were performed among various variables of interest. Their results succeeded in proving the complex relationships among elements and frames in the *dispositif*.

Limitations of the collection method and sampling

Costs, time and representation constraints have convinced me to collect the data mainly through an online survey. It should be noted that the gathering of information from the WWW has both advantages and disadvantages. The Internet usage makes respondents more technology-friendly and, therefore, the specific effects of the mobile communication technology may appear more attenuated than in a study conducted in a classical way (telephone or face-to-face interviews), because non-users of mobile phones do not manifest extreme positions. Nevertheless, avoiding a general negative attitude towards modern technology could be an important advantage, because it prevents additional bias of interpretation. In addition, online studies are faster to conduct, cheaper and more user-friendly.

Taking these into consideration, a generalization to overall German online users was avoided. The study had exploratory intentions and mainly focused on the identification of relevant patterns and differences between sub-samples.

Limitations of the instrument

The instrument was constructed to answer the aforementioned objectives of the research. Therefore, it included questions about the frequency of mobile telephony usage in general and of its various functions and uses; about travel behavior (both assessments and perceptions); communication patterns; perceptions of communication, space, time and communicators; attitudes towards technology and its usage; demographics, etc.

Due to the explorative nature of the study, it was not possible to explore the influence of the general social sphere on usage, namely the impact of various socio-demographical variables, lifestyles and values on usage patterns. However, extensive and reliable quantitative studies are already available about the segmentation of users according to various socio-demographical characteristics, such as gender, education, profession, and income, as well as lifestyles and values. Socio-demographical variables were employed in this research mainly to highlight the impact of usage on various variables within particular subgroups. Besides, the results about travel behaviors should not be generalized to the overall population. In this area, a secondary analysis of large statistical data about traffic and usage of telecommunication technologies would have been particularly useful. Unfortunately, I have not been able to identify such studies in Germany until now. In the current research, due to the limited statistical power, mobility effects on cellular telephony usage and vice-versa were difficult to identify. However, I believe that the interpretation of subjective perceptions of one's mobility constitutes a valuable result of the study.

Data limitations

Overall, many important variables were not normally distributed. This fact limited the extensive usage of correlation and regression and more complicated analyses, based on linear association. As a consequence, the main statistical tools used to highlight differences were non-parametric tests, instead of Student tests or ANOVA. In addition, the great number of categorical variables narrowed the range of possible statistical analyses. Nevertheless, the majority of the multiple categorical variables were generally coded as “dummy” (0/1) to simplify interpretation.

5.3. Further Implications and Suggestions for Future Research

The current empirical analysis was mainly conducted at the micro-level, with emphasis on particular associations among usage, communication, and mobility patterns. It comes closer to the various domestication studies conducted about mobile telephony effects on communicators¹⁰². The main contribution of the present research is that these effects have

¹⁰² A good categorization of the previous studies with these characteristics was produced by Geser (2003). He examined the implications of mobile telephony usage for human individuals produced by various studies and counted among them: “the immanent functional expansion of phone usages, the emancipation from local settings, opportunities for complexity avoidance and regressive social insulation, role-integrative functions, the need to control and limit accessibility, the simultaneous increase of individual empowerment, personal

always been understood from the point of view of the *dispositif* approach, as emerging from the interaction among technology, user, and program frames. However, it should not be forgotten that the *dispositif* approach has always manifested the ambition to produce macro-level explanations. General structuring principles are to be advanced and promoted. This could be an interesting topic for further studies about the societal transformations as a result of the deeper domestication of this type of pervasive communication technology over a longer period of time.

At this point, the current study could constitute a springboard for future theoretical and empirical analyses focused on the constitution of the social frame within the *dispositif* in relation to the other frames and elements. Excepting some limited references, the usage of mobile phones in organizational environments and their roles in the functioning of the organization remain unexplored and can constitute an interesting research direction. Also, the segmentation of users according to various criteria can be performed and examined from the perspective of the constitution of the user frame in the *dispositif*. In this respect, special target groups, such as "trans-local elites" and "place-independent communities" (Geser, 2003) could be examined.

Finally, a conceptual confrontation between the *dispositif* and the systemic approach could constitute, itself, a productive research direction.

In conclusion, I think that the current work represents an open door to a type of comprehension that has not lost its appeal and explanatory power. The capacity of the *dispositif* concept to model our increasingly complex relationships with the surrounding devices in an ever-growing technicized world could make this approach stimulating for future studies in science and technology.

responsibility and social controls, the lost advantages of temporary non-connection". At the level of interpersonal relations (not to be confounded with communication), he singled out "the enlargement of peripheral relationships and weak social ties, the role of the SMS as a channel for low-threshold, non-intrusive contact initiation, the deregulation of agendas, and the evolutionary rise of "nomadic intimacy" and "nomadic social participation". (Geser, 2003, online citation)

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APPENDIX

THE FRAME OF USES AND FUNCTIONS

Table 1. Answers to the open-ended question: Which of the mobile phone applications are the most important for you? (multiple answers)

Base mobile users (76)

Category label	Code	Count	Pct of Responses	Pct of Cases
Voice telephony	1	50	52.5	67.6
SMS	2	16	16.6	21.6
Vibrate mode	3	5	5.3	6.8
Phone directory	4	5	5.3	6.8
Contact database	6	2	2.1	2.7
Calendar	7	4	4.2	5.4
Data transfer	8	2	2.1	2.7
Key lock	9	1	1.1	1.4
Clock	10	2	2.1	2.7
Last calls	11	1	1.1	1.4
Games	12	1	1.1	1.4
Bluetooth	21	1	1.1	1.4
Schedules	22	1	1.1	1.4
To be able to call from everywhere	26	1	1.1	1.4
AKKU	27	1	1.1	1.4
Other	99	2	2.1	2.7
		-----	-----	-----
	Total responses	95	100.0	128.8

Note: *Sum of percents over 100 due to the multiple answers

Table 2. Answers to the open-ended question 2.8. Which of the mobile phone applications are the least important for you? (multiple answers)

Base mobile users (76)

Category label	Code	Count	Pct of Responses	Pct of Cases
Clock	10	1	1.2	1.4
Games	12	27	33.3	39.1
Calculator	13	2	2.5	2.9
SMS Chat	14	15	18.5	21.7
WAP	15	13	16.0	18.8
Navigation	19	2	2.5	2.9
MP3	20	10	12.3	14.5
Screensaver	24	2	2.5	2.9
Ringtones	25	2	2.5	2.9
Menu „Im Gespräch“	28	1	1.2	1.4
Other	99	6	7.5	8.6
		-----	-----	-----
	Total responses	81	100.0	117.4

Note: *Sum of percents over 100 due to the multiple answers

Table 3-4. Answers to the open-ended question about the face to face communication content

	heavy use (Base 76)r		not/light use Base (75)r	
	Count	Column % of answers	Count	Column % of answers
Politics	12	21	22	33
Private <i>Smalltalk</i>	8	14	15	22
Love	4	7	6	9
Theater/arts/movies	6	11	12	18
Everything	7	13	7	10
Family	6	11	16	24
	1	2	1	1
Querbeet				
Daily news	16	29	24	36
Weather	1	2	2	3
Diverse problems	4	7	7	10
Work or study	18	32	22	33
Pastime/parties	4	7	7	10
Acquaintances/friends	5	9	3	4
Computer	4	7	5	7
Cars	2	4	1	1
Memories	2	4		
Music	4	7	7	10
Short information	1	2	1	1
Meeting places	1	2		
Localization: Where I am	1	2		
Appointments	2	4	2	3
Meetings	1	2	1	1
Technical questions	2	4		
Plans	2	4	3	4
Longer stories			1	1
Sex	2	4	1	1
Jokes			1	1
Health	2	4	12	18
Pets			1	1
Contact renewal	1	2		
Shopping	1	2	3	4
“ <i>Je nach dem Gott und Welt</i> “	4	7	2	3
Money	2	4		
Sport	2	4	4	6
Intimate issues	2	4	1	1
„How are you?“	1	2	2	3
Gossiping			2	3
Hobbies	2	4	7	10
Travel	2	4	2	3
Bussiness	1	2	1	1
Spontaneous exchange of thoughts	1	2		
Perceptions	1	2		
Other	2	4	2	3

COMMUNICATION CONTENT

Table 5. Answers to the open-ended question about the content of mobile communication.

Base mobile users (76)

Category label	Code	Count	Pct of Responses	Pct of Cases
Schedules	24	23	19.7	41.1
Appointments	27	17	14.5	30.4
Short information	21	11	9.4	19.6
Meeting places	22	7	6.0	12.5
Work/study	11	6	5.1	10.7
Requirements to solve short problems	25	4	3.4	7.1
Everything	5	3	2.6	5.4
Daily issues	8	3	2.6	5.4
Places where the communicator is located	23	3	2.6	5.4
Delays. scheduling problems	26	3	2.6	5.4
Technical questions	28	3	2.6	5.4
Plans	29	3	2.6	5.4
Sex	34	3	2.6	5.4
How are you?	60	3	2.6	5.4
Love	3	3	2.6	5.4
Politics	1	2	1.7	3.6
Route descriptions	19	2	1.7	3.6
Organization/Planning	20	2	1.7	3.6
Shopping	45	2	1.7	3.6
Computer	14	2	1.7	3.6
Smalltalk	2	1	.9	1.8
Problems	10	1	.9	1.8
About acquaintances/friends	13	1	.9	1.8
Music	18	1	.9	1.8
Hobbies	63	1	.9	1.8
"Where are you now?"	64	1	.9	1.8
Spontaneous exchange of thoughts	68	1	.9	1.8
Other	99	3	2.7	5.4
		-----	-----	-----
	Total responses	117	100.0	208.9

**Table 6a. Answers to the open-ended question about issues avoided in mobile communication.
Users (Base 76)**

Category label	Code	Count	Pct of Responses	Pct of Cases
Long stories	33	11	20.4	26.8
Very intimate things	50	9	16.7	22.0
Sex	34	5	9.3	12.2
Money	47	5	9.3	12.2
Bad news	32	4	7.4	9.8
Illegal things	30	2	3.7	4.9
<i>smalltalk</i>	2	2	3.7	4.9
Politics	1	1	1.9	2.4
Love	3	1	1.9	2.4
About everything	5	1	1.9	2.4
Work or study	11	1	1.9	2.4
Computer	14	1	1.9	2.4
Music	18	1	1.9	2.4
Task sharing	31	1	1.9	2.4
Credit cards/Banking	36	1	1.9	2.4
Unserious issues	39	1	1.9	2.4
Passwords	62	1	1.9	2.4
Nothing	38	5	9.3	12.2
Other	99	1	1.9	2.4
		-----	-----	-----
	Total responses	54	100.0	131.7

Note: *Sum of percents over 100 due to the multiple answers

Table 6 b. Answers to the open-ended question about the content of SMS communication Users (Base 76)

Category label	Code	Count	Pct of Responses	Pct of Cases
Schedules	24	16	18.2	30.2
Love	3	10	11.4	18.9
Short information	21	9	10.2	17.0
Meetings	27	7	8.0	13.2
Greetings	40	7	8.0	13.2
Jokes	37	4	4.5	7.5
Short problems. requirements to solve something	25	4	4.5	7.5
"How are you?"	60	4	4.5	7.5
Current daily issues	8	1	1.1	1.9
Pastime/Parties	12	2	2.3	3.8
Music	18	1	1.1	1.9
Meeting places	22	2	2.3	3.8
Localization: Where the communicator is	23	3	3.4	5.7
Problems with appointments/delays	26	2	2.3	3.8
Plans	29	1	1.1	1.9
Sex	34	3	3.4	5.7
The time the communicator is home	35	1	1.1	1.9
Nothing	38	3	3.4	5.7
Unserious themes	39	1	1.1	1.9
Something . which does not requires an answer	41	2	2.3	3.8
Sport/Sport results	48	1	1.1	1.9
Greetings/wishes	51	2	2.3	3.8
Backbites	61	1	1.1	1.9
Requirements to buy something on the way....65		1	1.1	1.9
		-----	-----	-----
	Total responses	88	100.0	166.0

Note: *Sum of percents over 100 due to the multiple answers

COMMUNICATIVE SITUATIONS

Table 7 Assessments of the suitability of the various media for: *Pleasure to communicate*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	18	25	14	19
	mentioned	53	75	61	81
chat	not mentioned	39	53	48	64
	mentioned	35	47	27	36
fixed phone	not mentioned	43	58	41	55
	mentioned	31	42	34	45
mobile phone	not mentioned	58	78	66	88
	mentioned	16	22	9	12
SMS	not mentioned	59	80	71	95
	mentioned	15	20	4	5
Fax	not mentioned	74	100	74	99
	mentioned			1	1
Letters	not mentioned	63	85	64	85
	mentioned	11	15	11	15
e-mail	not mentioned	50	68	35	47
	mentioned	24	32	40	53

Table 8 Assessments of the suitability of the various media for: *Sex calls*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	30	41	38	51
	mentioned	44	59	37	49
chat	not mentioned	53	72	60	80
	mentioned	21	28	15	20
fixed phone	not mentioned	63	85	66	88
	mentioned	11	15	9	12
mobile phone	not mentioned	69	93	75	100
	mentioned	5	7		
SMS	not mentioned	73	99	75	100
	mentioned	1	1		
Fax	not mentioned	73	99	75	100
	mentioned	1	1		
Letters	not mentioned	70	95	69	92
	mentioned	4	5	6	8
e-mail	not mentioned	71	96	74	99
	mentioned	3	4	1	1

Table 9. Assessments of the suitability of the various media for: *Asking if everything is OK*

	heavy users (Base 76)		not/light users (Base 75)		
	Count	Col %	Count	Col %	
face	not mentioned	48	66	43	57
	mentioned	25	34	32	43
chat	not mentioned	66	90	68	91
	mentioned	7	10	7	9
fixed phone	not mentioned	31	42	16	21
	mentioned	42	58	59	79
mobile phone	not mentioned	34	47	64	85
	mentioned	39	53	11	15
SMS	not mentioned	50	68	71	95
	mentioned	23	32	4	5
Fax	not mentioned	73	100	73	97
	mentioned			2	3
Letters	not mentioned	71	97	64	85
	mentioned	2	3	11	15
e-mail	not mentioned	52	72	31	41
	mentioned	20	28	44	59

Table 10. Assessments of the suitability of the various media for: *Canceling appointments*

	heavy users (Base 76)		not/light users (Base 75)		
	Count	Col %	Count	Col %	
face	not mentioned	52	73	46	62
	mentioned	19	27	28	38
chat	not mentioned	69	96	71	96
	mentioned	3	4	3	4
fixed phone	not mentioned	35	49	14	19
	mentioned	37	51	60	81
mobile phone	not mentioned	19	26	55	74
	mentioned	53	74	19	26
SMS	not mentioned	46	64	66	89
	mentioned	26	36	8	11
Fax	not mentioned	69	96	68	92
	mentioned	3	4	6	8
Letters	not mentioned	70	97	71	96
	mentioned	2	3	3	4
e-mail	not mentioned	48	67	34	46
	mentioned	24	33	40	54

Table 11. Assessments of the suitability of the various media for: *Making appointments*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	45	63	37	49
	mentioned	27	38	38	51
chat	not mentioned	62	86	70	93
	mentioned	10	14	5	7
fixed phone	not mentioned	21	29	15	20
	mentioned	51	71	60	80
mobile phone	not mentioned	26	36	60	80
	mentioned	46	64	15	20
SMS	not mentioned	48	67	67	89
	mentioned	24	33	8	11
Fax	not mentioned	67	93	66	88
	mentioned	5	7	9	12
Letters	not mentioned	68	94	67	89
	mentioned	4	6	8	11
e-mail	not mentioned	40	56	30	40
	mentioned	31	44	45	60

Table 12. Assessments of the suitability of the various media for: *Financial counseling, banking*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	34	48	27	36
	mentioned	37	52	48	64
chat	not mentioned	68	96	75	100
	mentioned	3	4		
fixed phone	not mentioned	54	76	55	73
	mentioned	17	24	20	27
mobile phone	not mentioned	65	92	73	97
	mentioned	6	8	2	3
SMS	not mentioned	69	97	74	99
	mentioned	2	3	1	1
Fax	not mentioned	67	94	68	91
	mentioned	4	6	7	9
Letters	not mentioned	65	92	68	91
	mentioned	6	8	7	9
e-mail	not mentioned	50	70	52	69
	mentioned	21	30	23	31

Table 13. Assessments of the suitability of the various media for: *Making invitations*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	26	37	22	29
	mentioned	45	63	53	71
chat	not mentioned	60	85	71	95
	mentioned	11	15	4	5
fixed phone	not mentioned	32	46	24	32
	mentioned	38	54	51	68
mobile phone	not mentioned	50	70	64	85
	mentioned	21	30	11	15
SMS	not mentioned	57	80	72	96
	mentioned	14	20	3	4
Fax	not mentioned	67	94	72	96
	mentioned	4	6	3	4
Letters	not mentioned	38	54	46	61
	mentioned	33	46	29	39
e-mail	not mentioned	38	54	28	37
	mentioned	33	46	47	63

Table 14. Assessments of the suitability of the various media for: *Solving a work/study problem*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	15	21	14	19
	mentioned	57	79	61	81
chat	not mentioned	59	82	69	92
	mentioned	13	18	6	8
fixed phone	not mentioned	45	63	40	53
	mentioned	27	38	35	47
mobile phone	not mentioned	52	72	68	91
	mentioned	20	28	7	9
SMS	not mentioned	71	99	75	100
	mentioned	1	1		
Fax	not mentioned	69	96	67	89
	mentioned	3	4	8	11
Letters	not mentioned	70	97	72	96
	mentioned	2	3	3	4
e-mail	not mentioned	50	69	42	56
	mentioned	22	31	33	44

Table 15. Assessments of the suitability of the various media for: *communicating short information*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	62	85	52	69
	mentioned	11	15	23	31
chat	not mentioned	67	92	68	91
	mentioned	6	8	7	9
fixed phone	not mentioned	55	76	37	49
	mentioned	17	24	38	51
mobile phone	not mentioned	53	74	65	87
	mentioned	19	26	10	13
SMS	not mentioned	26	36	61	81
	mentioned	47	64	14	19
Fax	not mentioned	67	93	68	91
	mentioned	5	7	7	9
Letters	not mentioned	72	100	72	96
	mentioned			3	4
e-mail	not mentioned	33	45	14	19
	mentioned	40	55	61	81

Table 16. Assessments of the suitability of the various media for: *communicating bad news*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	13	18	20	27
	mentioned	60	82	55	73
chat	not mentioned	71	97	74	99
	mentioned	2	3	1	1
fixed phone	not mentioned	49	68	37	49
	mentioned	23	32	37	49
mobile phone	not mentioned			1	1
	mentioned	58	81	71	95
SMS	not mentioned	14	19	4	5
	mentioned	68	93	72	96
Fax	not mentioned	5	7	3	4
	mentioned	71	99	74	99
Letters	not mentioned	1	1	1	1
	mentioned	62	86	62	83
e-mail	not mentioned	10	14	13	17
	mentioned	55	79	51	69
		15	21	23	31

Table 17. Assessments of the suitability of the various media for: *Booking tickets/Pre-buying*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	43	62	36	49
	mentioned	26	38	37	51
chat	not mentioned	67	97	73	100
	mentioned	2	3		
fixed phone	not mentioned	41	59	38	52
	mentioned	28	41	35	48
mobile phone	not mentioned	53	77	69	95
	mentioned	16	23	4	5
SMS	not mentioned	65	94	72	99
	mentioned	4	6	1	1
Fax	not mentioned	65	94	62	85
	mentioned	4	6	11	15
Letters	not mentioned	66	96	69	95
	mentioned	3	4	4	5
e-mail	not mentioned	31	44	29	40
	mentioned	39	56	44	60

Table 18. Assessments of the suitability of the various media for: *playing tricks/telling jokes*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	39	57	24	33
	mentioned	30	43	48	67
chat	not mentioned	60	87	61	85
	mentioned	9	13	11	15
fixed phone	not mentioned	57	83	56	78
	mentioned	12	17	16	22
mobile phone	not mentioned	60	87	69	96
	mentioned	9	13	3	4
SMS	not mentioned	49	71	65	90
	mentioned	20	29	7	10
Fax	not mentioned	63	91	67	93
	mentioned	6	9	5	7
Letters	not mentioned	68	99	68	94
	mentioned	1	1	4	6
e-mail	not mentioned	40	58	48	67
	mentioned	29	42	24	33

Table 19. Assessments of the suitability of the various media for: *talking about music, films*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	13	18	10	14
	mentioned	58	82	61	86
chat	not mentioned	49	69	57	80
	mentioned	22	31	14	20
fixed phone	not mentioned	50	70	53	75
	mentioned	21	30	18	25
mobile phone	not mentioned	65	92	70	99
	mentioned	6	8	1	1
SMS	not mentioned	68	96	70	99
	mentioned	3	4	1	1
Fax	not mentioned	71	100	70	99
	mentioned			1	1
Letters	not mentioned	69	97	70	99
	mentioned	2	3	1	1
e-mail	not mentioned	61	86	51	72
	mentioned	10	14	20	28

Table 20 . Assessments of the suitability of the various media for: *Asking for information about various products'*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	38	55	38	54
	mentioned	31	45	33	46
chat	not mentioned	55	80	60	85
	mentioned	14	20	11	15
fixed phone	not mentioned	41	59	47	66
	mentioned	28	41	24	34
mobile phone	not mentioned	62	90	69	97
	mentioned	7	10	2	3
SMS	not mentioned	67	97	71	100
	mentioned	2	3		
Fax	not mentioned	65	94	61	86
	mentioned	4	6	10	14
Letters	not mentioned	66	96	66	93
	mentioned	3	4	5	7
e-mail	not mentioned	37	54	26	37
	mentioned	32	46	45	63

Table 21. Assessments of the suitability of the various media for: *Love messages, flirting*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	13	19%	7	10%
	mentioned	56	81%	65	90%
chat	not mentioned	46	66%	58	81%
	mentioned	24	34%	14	19%
fixed phone	not mentioned	51	73%	47	65%
	mentioned	19	27%	25	35%
mobile phone	not mentioned	57	81%	68	94%
	mentioned	13	19%	4	6%
SMS	not mentioned	55	79%	71	99%
	mentioned	15	21%	1	1%
Fax	not mentioned	68	97%	72	100%
	mentioned	2	3%		
Letters	not mentioned	64	89%	67	93%
	mentioned	8	11%	5	7%
e-mail	not mentioned	53	74%	58	81%
	mentioned	19	26%	14	19%

Table 22. Assessments of the suitability of the various media for: *Contacting police/hospital in emergency*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	63	88	61	85
	mentioned	9	13	11	15
chat	not mentioned	71	100	71	99
	mentioned			1	1
fixed phone	not mentioned	30	42	14	19
	mentioned	41	58	58	81
mobile phone	not mentioned	9	13	47	65
	mentioned	61	87	25	35
SMS	not mentioned	68	96	71	99
	mentioned	3	4	1	1
Fax	not mentioned	70	99	71	99
	mentioned	1	1	1	1
Letters	not mentioned	71	100	70	97
	mentioned			2	3
e-mail	not mentioned	70	99	70	97
	mentioned	1	1	2	3

Table 23. Assessments of the suitability of the various media for: *making excuses*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	8	11	16	22
	mentioned	62	89	56	78
chat	not mentioned	66	94	69	96
	mentioned	4	6	3	4
fixed phone	not mentioned	38	54	34	47
	mentioned	32	46	38	53
mobile phone	not mentioned	51	73	67	93
	mentioned	19	27	5	7
SMS	not mentioned	58	83	72	100
	mentioned	12	17		
Fax	not mentioned	68	97	71	99
	mentioned	2	3	1	1
Letters	not mentioned	61	87	56	78
	mentioned	9	13	16	22
e-mail	not mentioned	49	70	53	74
	mentioned	21	30	19	26

Table 24 . Assessments of the suitability of the various media for: *curious about what's new about friends/ acquaintances*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	no	36	50	34	47
	face	36	50	38	53
chat	no	65	90	64	89
	chat	7	10	8	11
festnetz	no	26	36	19	26
	festnetz	45	64	53	74
mobile phone	no	37	51	65	90
	handy	35	49	7	10
sms	no	51	70	69	96
	sms	21	30	3	4
fax	no	71	99	72	100
	fax	1	2		
letters		67	93	65	90
	Briefe	5	7	7	10
e-mail	no	47	65	38	53
	e-mail	25	35	34	47

Table 25a . Assessments of the suitability of the various media for: *Reassuring the family while traveling*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	67	94	68	94
	mentioned	4	6	4	6
chat	not mentioned	71	100	71	100
	mentioned				
fixed phone	not mentioned	40	56	15	21
	mentioned	31	44	57	79
mobile phone	not mentioned	19	27	52	72
	mentioned	52	73	20	28
SMS	not mentioned	48	68	65	90
	mentioned	23	32	7	10
Fax	not mentioned	68	96	69	96
	mentioned	3	4	3	4
Letters	not mentioned	65	92	67	93
	mentioned	6	8	5	7
e-mail	not mentioned	55	77	51	71
	mentioned	16	23	21	29

Table 25b. Assessments of the suitability of the various media for: *Shopping*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	39	60	32	45
	mentioned	26	40	39	55
chat	not mentioned	62	95	71	100
	mentioned	3	5		
fixed phone	not mentioned	57	88	55	77
	mentioned	8	12	16	23
mobile phone	not mentioned	62	95	67	94
	mentioned	3	5	4	6
SMS	not mentioned	64	98	70	99
	mentioned	1	2	1	1
Fax	not mentioned	58	89	62	87
	mentioned	7	11	9	13
Letters	not mentioned	61	94	61	86
	mentioned	4	6	10	14
e-mail	not mentioned	18	27	26	37
	mentioned	49	73	45	63

Table 26. Assessments of the suitability of the various media for: *greeting, congratulating*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	17	25	17	23
	mentioned	52	75	56	77
chat	not mentioned	63	91	65	89
	mentioned	6	9	8	11
fixed phone	not mentioned	29	42	28	38
	mentioned	40	58	45	62
mobile phone	not mentioned	37	54	63	86
	mentioned	32	46	10	14
SMS	not mentioned	45	65	68	93
	mentioned	24	35	5	7
Fax	not mentioned	65	94	70	96
	mentioned	4	6	3	4
Letters	not mentioned	55	80	53	73
	mentioned	14	20	20	27
e-mail	not mentioned	42	61	31	42
	mentioned	27	39	42	58

Table 27. Assessments of the suitability of the various media for: *communicating good news*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	19	27	15	21
	mentioned	52	73	58	79
chat	not mentioned	65	92	67	92
	mentioned	6	8	6	8
fixed phone	not mentioned	33	46	24	33
	mentioned	38	54	49	67
mobile phone	not mentioned	32	45	63	86
	mentioned	39	55	10	14
SMS	not mentioned	47	67	66	90
	mentioned	23	33	7	10
Fax	not mentioned	67	94	67	92
	mentioned	4	6	6	8
Letters	not mentioned	66	93	57	78
	mentioned	5	7	16	22
e-mail	not mentioned	38	54	27	37
	mentioned	33	46	46	63

Table 28. Assessments of the suitability of the various media for: *Planning a trip*

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Col %	Count	Col %
face	not mentioned	26	38	27	37
	mentioned	43	62	46	63
chat	not mentioned	60	87	62	85
	mentioned	9	13	11	15
fixed phone	not mentioned	46	67	38	52
	mentioned	23	33	35	48
mobile phone	not mentioned	57	83	69	95
	mentioned	12	17	4	5
SMS	not mentioned	66	96	72	99
	mentioned	3	4	1	1
Fax	not mentioned	66	96	68	93
	mentioned	3	4	5	7
Letters	not mentioned	67	97	68	93
	mentioned	2	3	5	7
e-mail	not mentioned	37	54	26	36
	mentioned	32	46	47	64

DETAILED RESULTS ABOUT AFFECTIVE REACTIONS IN CASUAL SITUATIONS IN TABELAR FORM

Table 29. Reassurance and safety dimensions . Cross analysis by gender

		Male (Base 99)				Female (Base 52)			
		user, non user		user, non user		user, non user		user, non user	
		heavy user (49)		not/light user (50)		heavy user (27)		not/light user (25)	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Solving emergencies	no	3	7	34	71	6	25	13	54
	yes	43	93	14	29	18	75	11	46
Mobile conversation		43	93	14	29	18	75	11	46
Solving emergencies SMS	no	45	96	48	100	23	96	23	96
	yes	2	4	0	0	1	4	1	4
Reassuring the family Mobile	no	10	22	37	77	9	36	15	63
	yes	36	78	11	23	16	64	9	37
Reassuring the family SMS	no	31	67	45	94	17	68	20	83
	yes	15	33	3	6	8	32	4	17

Table 30 . Reassurance and safety dimensions . Cross analysis by age

		Up to 27 (Base 50)				28-37 (Base 52)				38-65 (Base 49)			
		user, non user				user, non user				user, non user			
		Heavy user		Not/light user		Heavy user		Not/light user		Heavy user		not/light user	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %
Solving emergencies Mobile conversation	no	6	25	16	73	0	0	12	52	3	17	19	70
	yes	18	75	6	27	28	100	11	48	15	83	8	30
Solving emergencies SMS	no	24	96	21	95	27	96	23	100	17	94	27	100
	yes	1	4	1	5	1	4	0	0	1	6	0	0
Reassuring the family Mobile	no	10	38	17	77	5	19	15	65	4	22	20	74
	yes	16	62	5	23	22	81	8	35	14	78	7	26
Reassuring the family SMS	no	13	50	17	77	20	74	23	100	15	83	25	93
	yes	13	50	5	23	7	26	0	0	3	17	2	7

Table 31. Reassurance and safety dimensions . Cross analysis by education

		Level of education											
		Low (18)				Medium (65)				High (66)			
		user, non user				user, non user				user, non user			
		heavy user (12)		not/light user (6)		heavy user (35)		not/light user (30)		heavy user (29)		not/light user (37)	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %
Solving emergencies Mobile conversation	no	2	20	4	67	6	18	19	66	1	4	22	63
	yes	8	80	2	33	27	82	10	34	26	96	13	37
Solving emergencies SMS	no	10	91	6	100	32	97	28	97	26	96	35	100
	yes	1	9	0	0	1	3	1	3	1	4	0	0
Reassuring the family Mobile	no	5	45	6	100	8	24	20	69	6	22	24	69
	yes	6	55	0	0	25	76	9	31	21	78	11	31
Reassuring the family SMS	no	6	55	4	67	23	70	24	83	19	70	35	100
	yes	5	45	2	33	10	30	5	17	8	30	0	0

Table 32. Impuls to communicate (“Lust auf Kommunikation). Cross analysis by age

		NTILES OF AGF1.1											
		Up to 27 (Base 50)				28-37 (Base 52)				38-65 (Base 49)			
		heavy user (28)		not/light user (22)		heavy user (28)		not/light user (24)		heavy user (20)		not/light user (29)	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %
Handy	Not mentioned	20	74	18	82	25	89	22	92	13	68	26	90
	Mentioned	7	26	4	18	3	11	2	8	6	32	3	10
SMS	Not mentioned	18	67	22	100	25	89	22	92	16	84	27	93
	mentioned	9	33	0	0	3	11	2	8	3	16	2	7

Table 33. Desire to communicate (“Lust zu Kommunizieren). Cross analysis by gender

		gender									
		Male (Base 99)					Female (Base 52)				
		user, non user					user, non user				
		heavy user (49)		not/light user (50)			heavy user (27)		not/light user (25)		
		Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %
Handy	Not mentioned	36	75	44	88	22	85	22	88		
	Mentioned	12	25	6	12	4	15	3	12		
SMS	Not mentioned	38	79	49	98	21	81	22	88		
	Mentioned	10	21	1	2	5	19	3	12		

Table 34. Feelings: Enjoyment . Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	23	34	23	32
	Mentioned	45	664	48	68
e-mail	Not mentioned	34	504	39	55
	Mentioned	34	504	32	45
fix phone	Not mentioned	47	694	45	63
	Mentioned	21	31	26	37
mobile phone	Not mentioned	49	72	71	100
	Mentioned	19	28	0	0
SMS	Not mentioned	49	72	71	100
	Mentioned	19	28	0	0
letters	Not mentioned	55	81	61	86
	Mentioned	13	19	10	14

Table 35. Feelings: Power, in charge of communication . Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	42	62	48	70
	Mentioned	26	38	21	30
e-mail	Not mentioned	53	78	54	78
	Mentioned	15	22	15	22
fix phone	Not mentioned	56	82	57	83
	Mentioned	12	18	12	17
mobile phone	Not mentioned	58	85	69	100
	Mentioned	10	15	0	0
SMS	Not mentioned	59	87	69	100
	Mentioned	9	13	0	0
letters	Not mentioned	59	87	63	91
	Mentioned	9	13	6	9

Table 36 Feelings: Free to tell anything. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	17	25	26	36
	Mentioned	51	75	46	64
e-mail	Not mentioned	48	71	36	50
	Mentioned	20	29	36	50
fix phone	Not mentioned	45	66	44	61
	Mentioned	23	34	28	39
mobile phone	Not mentioned	44	65	72	100
	Mentioned	24	35	0	0
SMS	Not mentioned	51	75	72	100
	Mentioned	17	25	0	0
letters	Not mentioned	53	78	59	82
	Mentioned	15	22	13	18

Note: * difference until total subjects is due to the category are „not suitable to any medium”. Variable to variable exclusion of missing values

Table 37. Feelings: Complete comprehension. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	10	15	21	30
	Mentioned	58	85	48	70
e-mail	Not mentioned	56	82	59	86
	Mentioned	12	18	10	14
fix phone	Not mentioned	50	74	49	71
	Mentioned	18	26	20	29
mobile phone	Not mentioned	53	78	69	100
	Mentioned	15	22	0	0
SMS	Not mentioned	60	88	69	100
	Mentioned	8	12	0	0
letters	Not mentioned	63	94	64	93
	Mentioned	4	6	5	7

Table 38. Feelings: the feeling of closeness. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	5	7	7	10
	Mentioned	62	93	65	90
e-mail	Not mentioned	63	94	68	94
	Mentioned	4	6	4	6
fix phone	Not mentioned	57	85	55	76
	Mentioned	10	15	17	24
mobile phone	Not mentioned	58	87	72	100
	Mentioned	9	13	0	0
SMS	Not mentioned	66	99	72	100
	Mentioned	1	1	0	0
letters	Not mentioned	60	90	66	92
	Mentioned	7	10	6	8

Table 39. Feelings: the feeling of stress/annoyance. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	59	87	50	70
	Mentioned	9	13	21	30
e-mail	Not mentioned	62	91	68	96
	Mentioned	6	9	3	4
fix phone	Not mentioned	52	76	44	62
	Mentioned	16	24	27	38
mobile phone	Not mentioned	46	68	71	100
	Mentioned	22	32	0	0
SMS	Not mentioned	55	81	71	100
	Mentioned	13	19	0	0
letters	Not mentioned	65	96	65	92
	Mentioned	3	4	6	8

Table 40. Feelings: the feeling of temporal pressure. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	64	97	62	89
	Mentioned	2	3	8	11
e-mail	Not mentioned	61	91	55	79
	Mentioned	6	9	15	21
fix phone	Not mentioned	60	90	46	66
	Mentioned	7	10	24	34
mobile phone	Not mentioned	36	54	70	100
	Mentioned	31	46	0	0
SMS	Not mentioned	56	84	70	100
	Mentioned	11	16	0	0
letters	Not mentioned	64	96	66	96
	Mentioned	3	4	3	4

Table 41. Feelings: pressure to answer. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	52	78	50	72
	Mentioned	15	22	19	28
e-mail	Not mentioned	57	85	56	82
	Mentioned	10	15	12	18
fix phone	Not mentioned	51	76	46	68
	Mentioned	16	24	22	32
mobile phone	Not mentioned	51	76	68	100
	Mentioned	16	24	0	0
SMS	Not mentioned	54	81	68	100
	Mentioned	13	19	0	0
letters	Not mentioned	55	82	57	84
	Mentioned	12	18	11	16

Table 42. Unpleasant expectations. Analysis by usage

		heavy users (Base 76)		not/light users (Base 75)	
		Count	Column %	Count	Column %
face	Not mentioned	59	88	60	88
	Mentioned	8	12	8	12
e-mail	Not mentioned	65	97	66	99
	Mentioned	2	3	1	1
fix phone	Not mentioned	58	87	54	81
	Mentioned	9	13	13	19
mobile phone	Not mentioned	60	90	67	100
	Mentioned	7	10	0	0
SMS	Not mentioned	63	94	67	100
	Mentioned	4	6	0	0
letters	Not mentioned	54	81	62	93
	Mentioned	13	19	5	7

OTHER RESULTS ABOUT TRAVEL AMOUNT IN TABELAR FORM

Table 43. The amount of travel in hours (for commuting and irregular professional travel) and in days (for holiday travel and other private travel

How long dūr you travel on average? (Wie lange sind Sie durchschnittlich unterwegs – im Auto, Bahn, Flugzeug, Fahrrad, Bus, etc.)

	user, non user	N	Mean	Std. Deviation
Pendlerfahrten (Commuting in hours)	heavy user	72	.832	.796
	not/light user	67	.747	.745
unregelmäßige Berufnediente Fahrten ^o (irregular proffesional travel in hours)	heavy user	69	1.11	1.86
	not/light user	66	.58	1.36
Urlaubreisen (holiday travel in days)	heavy user	72	17.71	14.89
	not/light user	68	14.84	11.46
Andere private Fahrten (other private travel in days)	heavy user	72	32.31	49.85
	not/light user	63	27.74	39.16

Notes: ^oThe Mann-Whitney test gave significant results $p \leq 0.1$)
Diff. Significant at 0.06

Table 44. The duration of travel. Cross analysis by the categories of experience with mobile telephony.

		Experience degree			Kruskall Wallis p
		Inexperienced	Experienced	<i>Non users</i>	
Commuting (hours)	Mean	1.03	.73	.73	
	Median	1.00	.50	.50	
	Std Deviation	1	1	1	
Irregular professional travel (hours)	Mean	.47	1.43	.60	
	Median	.00	.00	.00	
	Std Deviation	1	2	1	
Holiday travel (days)*	Mean	17.11	18.13	14.61	
	Median	15.00	20.00	13.00	
	Std Deviation	13	16	12	
Another private travel (days)	Mean	12.57	44.47	27.44	P= 0.004
	Median	5.00	20.00	10.00	
	Std Deviation	20	58	39	

Note The Kruskal Wallis test of difference for independent samples gave significant results $p \leq 0.05$). Difference between inexperienced-experienced experienced-non-users

Table 45. Travel in number of hours. Cross analysis by the extended degree of experience of users only

(Base 76)

	NTILES OF DEGREXP									Kruskall Wallis –
	Low (Base 26)			Medium (Base 29)			High (Base 21)			
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev	
Commuting (hours)	1.03	1.00	.83	.76	.50	.85	.69	.50	.58	
Irregular professional travel (hours)	.47	.00	1.02	1.06	.00	1.81	2.00	1.50	2.40	
Holiday travel (days)	17.11	15.00	12.51	20.61	20.00	17.94	14.65	14.50	11.63	
Other private travel (days)**	12.57	5.00	20.17	45.36	22.50	49.47	43.16	10.00	69.44	P=0.001 (1-2)

Note **The Kruskal Wallis test of difference for independent samples gave highly significant results $p \leq 0.01$. Difference appeared between low and medium-experienced users

Table 46. Travel in number of hours. Cross analysis by gender

gender			heavy user (76)	not/light user (75)	Test results Mann Whitney
Male (99)	Commuting (hours)	Mean	.85	.65	
		Median	1.00	.50	
		Std Deviation	.78	.69	
	Irregular professional travel (hours)*	Mean	1.31	.65	Signif at $p=0.042$
		Median	.10	.00	
		Std Deviation	1.84	1.53	
	Holiday travel (days)	Mean	15.90	13.10	
		Median	18.00	10.00	
		Std Deviation	11.54	11.80	
Other private travel (days)	Mean	32.13	33.69		
	Median	14.00	10.00		
	Std Deviation	50.60	44.80		
Female (52)	Commuting (hours)	Mean	.79	1.00	
		Median	.50	1.00	
		Std Deviation	.84	.84	
	Irregular professional travel (hours)	Mean	.68	.39	
		Median	.00	.00	
		Std Deviation	1.87	.72	
	Holiday travel (days)	Mean	21.33	19.00	
		Median	20.00	20.00	
		Std Deviation	19.79	9.61	
Other private travel (days)	Mean	32.64	13.95		
	Median	10.00	10.00		
	Std Deviation	49.42	14.13		

Notes: *The Mann-Whitney test gave significant results ($p \leq 0.05$) for irregular professional travel in the case of male users

Table 47. Travel frequency at various distances. Scale running form 1-never to 5-very oft . Cross analysis by experience with technology

	<i>Indicator comprised experience</i>				Kruskal Wallis p
	Inexperienced	Experienced	Non users		
trip: neighborhood	Mean	3.00	3.31	3.15	0.082
	Median	3.00	4.00	3.00	
	Std Deviation	1.41	1.53	1.64	
Same part of the city	Mean	3.48	3.55	3.37	
	Median	4.00	4.00	4.00	
	Std Deviation	1.38	1.38	1.47	
In the same city	Mean	3.64	4.04	4.52	
	Median	4.00	4.00	4.00	
	Std Deviation	1.10	1.15	3.95	
In the county (Land)	Mean	2.93	3.05	2.89	
	Median	3.00	3.00	3.00	
	Std Deviation	1.30	1.23	1.18	
In Germany ^o	Mean	2.08	2.67	2.27	0.013
	Median	2.00	2.00	2.00	
	Std Deviation	.50	1.21	.82	
Abroad *	Mean	1.88	2.23	1.82	
	Median	2.00	2.00	2.00	
	Std Deviation	.45	.86	.72	

Note *The Kruskal Wallis test of difference for independent samples gave significant results $p \leq 0.05$). The difference appeared between experienced users and non-users. ^oThe Kruskal Wallis test of difference for independent samples gave slightly significant results ($p \leq 0.1$).

Table 48. Travel frequency at various distances. Scale running form 1-never to 5-very oft. Cross analysis by experience of users with the mobile technology (only users, base 76)

	Degree of experience									Kruskal Wallis- p
	Low (Base 26)			Medium (Base 29)			High (Base 21)			
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev	
trip: neighborhood	3.00	3.00	1.41	3.41	4.00	1.39	3.19	4.00	1.72	P=0.018 (2-3); (1-3) P=0.051 (2-3*) (1-2)
Same part of the city	3.48	4.00	1.38	3.56	4.00	1.37	3.55	4.00	1.43	
In the same city	3.64	4.00	1.10	4.00	4.00	1.20	4.10	4.50	1.12	
In the county (Land)	2.93	3.00	1.30	2.96	3.00	1.16	3.16	3.00	1.34	
In Germany*	2.08	2.00	.50	2.35	2.00	1.06	3.10	2.50	1.29	
Abroad ^o	1.87	2.00	.45	2.43	2.00	.99	1.94	2.00	.56	

Note: *The Kruskal Wallis test of difference for independent samples gave significant results $p \leq 0.05$). The difference appeared between inexperienced users and very experienced and between medium experienced and very experienced users

^oThe Kruskal Wallis test of difference for independent samples gave slightly significant results ($p \leq 0.1$). Difference appeared between medium experienced and very experienced users, and inexperienced and medium-experienced users.

Table 49. Travel frequency at various distances. Scale running from 1-never to 5-very oft Cross analysis by gender

Gender			heavy users (Base 76)	not/light users (Base 75)	Mann Whitney Test results	
male (Base 99)	trip: neighborhood	Mean	3.38	3.00		
		Median	4.00	3.00		
		Std Deviation	1.56	1.62		
	Same part of the city	Mean	3.76	3.35		
		Median	4.00	4.00		
		Std Deviation	1.35	1.46		
	In the same city	Mean	4.16	4.04		
		Median	4.00	4.00		
		Std Deviation	.95	1.03		
	In the county (Land)	Mean	3.05	2.89		
		Median	3.00	3.00		
		Std Deviation	1.22	1.18		
	In Germany*	Mean	<u>2.72</u>	2.33		Sign at p=0.035
		Median	2.00	2.00		
		Std Deviation	1.05	.94		
Abroad	Mean	1.97	1.86			
	Median	2.00	2.00			
	Std Deviation	.54	.80			
Female (Base 52)	trip: neighborhood	Mean	2.96	3.39		
		Median	3.00	4.00		
		Std Deviation	1.37	1.64		
	Same part of the city	Mean	3.12	3.45		
		Median	3.00	4.00		
		Std Deviation	1.34	1.50		
	In the same city	Mean	3.50	5.30		
		Median	4.00	4.00		
		Std Deviation	1.33	6.56		
	In the county (Land)	Mean	2.96	2.85		
		Median	3.00	2.00		
		Std Deviation	1.37	1.14		
	In Germany	Mean	2.08	2.10		
		Median	2.00	2.00		
		Std Deviation	1.02	.30		
Abroad **	Mean	<u>2.35</u>	1.68	Sign at p=0.007		
	Median	2.00	2.00			
	Std Deviation	.98	.48			

Notes: *The Mann-Whitney test of difference between independent samples gave significant results ($p \leq 0.05$) for travel frequency in Germany in the case of male users and abroad for female users

Table 50 . Travel in number of hours. Cross analysis by age

Age			heavy user (76)	not/light user (75)
Young (50)	Commuting (hours)	Mean	.73	.69
		Median	.50	.50
		Std Deviation	.84	.88
	Irregular profesional travel (hours)	Mean	.78	.13
		Median	.00	.00
		Std Deviation	1.82	.32
	Holiday travel (days)	Mean	20.62	12.61
		Median	20.00	10.00
		Std Deviation	21.40	11.76
Other private travel (days)	Mean	22.16	12.75	
	Median	10.00	7.25	
	Std Deviation	35.41	13.51	
Medium (52)	Commuting (hours)	Mean	.92	.74
		Median	1.00	.63
		Std Deviation	.80	.73
	Irregular profesional travel (hours)	Mean	.86	.33
		Median	.00	.00
		Std Deviation	1.58	.70
	Holiday travel (days)	Mean	15.61	14.73
		Median	15.00	14.00
		Std Deviation	9.89	12.62
Other private travel (days)	Mean	37.61	22.45	
	Median	17.50	8.50	
	Std Deviation	58.97	39.97	
Older (49)	Commuting (hours)	Mean	.85	.80
		Median	1.00	1.00
		Std Deviation	.75	.66
	Irregular profesional travel (hours)	Mean	2.00	1.15
		Median	1.00	.00
		Std Deviation	2.12	1.98
	Holiday travel (days)	Mean	16.78	16.36
		Median	20.00	15.00
		Std Deviation	8.70	10.44
Other private travel (days)	Mean	37.84	44.52	
	Median	20.00	30.00	
	Std Deviation	51.90	46.37	

Table 51. Travel frequency at various distances. Scale running form 1-never to 5-very oft Cross analysis by age

Age			heavy user	not/light user
Young (50)	trip: neighborhood	Mean	3.04	2.70
		Median	3.00	2.50
		Std Deviation	1.37	1.63
	Same part of the city	Mean	3.56	3.20
		Median	4.00	3.00
		Std Deviation	1.40	1.40
	In the same city	Mean	4.11	4.25
		Median	4.00	5.00
		Std Deviation	1.05	1.02
	In the county (Land)	Mean	2.81	2.65
		Median	3.00	2.00
		Std Deviation	1.20	1.27
	In Germany**	Mean	2.50	1.85
		Median	2.00	2.00
		Std Deviation	1.38	.67
Abroad *	Mean	2.09	1.79	
	Median	2.00	1.00	
	Std Deviation	1.06	1.13	
Medium (52)	trip: neighborhood	Mean	3.31	3.22
		Median	4.00	3.00
		Std Deviation	1.62	1.70
	Same part of the city	Mean	3.65	3.55
		Median	4.00	4.00
		Std Deviation	1.32	1.50
	In the same city	Mean	3.68	4.00
		Median	4.00	4.00
		Std Deviation	1.22	.85
	In the county (Land)	Mean	3.33	3.14
		Median	3.00	3.00
		Std Deviation	1.32	1.13
	In Germany**	Mean	2.54	2.50
		Median	2.00	2.00
		Std Deviation	.88	.89
Abroad *	Mean	2.14	1.78	
	Median	2.00	2.00	
	Std Deviation	.57	.43	
Older (49)	trip: neighborhood	Mean	3.37	3.34
		Median	4.00	4.00
		Std Deviation	1.54	1.56
	Same part of the city	Mean	3.28	3.38
		Median	4.00	4.00
		Std Deviation	1.45	1.53
	In the same city	Mean	3.94	4.96
		Median	4.00	4.00
		Std Deviation	1.20	6.00
	In the county (Land)	Mean	2.95	2.84
		Median	3.00	2.00
		Std Deviation	1.31	1.11
	In Germany**	Mean	2.42	2.37
		Median	2.00	2.00
		Std Deviation	.90	.74
Abroad *	Mean	2.11	1.84	
	Median	2.00	2.00	
	Std Deviation	.46	.47	

Table 52. Perceptions of one's mobility and orientation. Cross analysis by occupation

		heavy users (Base 76)			not/light users (Base 75)		
		Mean	Median	Std. Dev	Mean	Median	Std. Dev
Work (base 93)	I can orientate myself very good in the city or elsewhere	4.04	4.00	.84	3.80	4.00	1.02
	I feel that I travel more than before	3.21	3.00	.80	2.89	3.00	1.06
Study (Base 41)	I can orientate myself very good in the city or elsewhere	3.18	3.25	.95	3.58	4.00	.96
	I feel that I travel more than before	2.56	2.75	.70	2.81	3.00	.93
no work P=0.038	I can orientate myself very good in the city or elsewhere	2.50	3.00	1.32	4.27	5.00	1.01
	I feel that I travel more than before	3.67	3.00	1.15	2.73	3.00	1.49

Table 53. Direct evaluation of the influence of mobile calls on travel

Which effects does the usage of the mobile phone/string phone have on the organization of private/ professional travel? (3 point scale) (Q2.16: Bitte denken Sie an die letzten Male, als Sie unterwegs waren und das Handy /das Festnetz benutzt haben. Hat das Handy/Festnetz Ihre Wege beeinflusst?)

Note: Responses referring to three days have been added and interpreted as multiple answers. Therefore the Pct of cases for one category may outnumber 100%

Heavy users:

Group \$HANDYIN

Category label	Code	Count	Pct of Responses	Pct of Cases
Initiates a way	1	22	11.4	33.3
Changes a route already initiated	2	36	18.7	54.5
Saves travel	3	47	24.4	71.2
No effect	4	88	45.6	133.3
		-----	-----	-----
	Total responses	193	100.0	292.4

Group \$FESTMOB effects of festnetz on mobility

Category label	Code	Count	Pct of Responses	Pct of Cases
Initiates a way	1	22	12.2	35.5
Changes a route already initiated	2	7	3.9	11.3
Saves travel	3	28	15.5	45.2
No effect	4	124	68.5	200.0
		-----	-----	-----
	Total responses	181	100.0	291.9

Non/light users effects of festnetz on mobility

Category label	Code	Count	Pct of Responses	Pct of Cases
Initiates a way	1	24	11.7	34.3
Changes a route already initiated	2	18	8.7	25.7
Saves travel	3	31	15.0	44.3
No effect	4	133	64.6	190.0
		-----	-----	-----
	Total responses	206	100.0	294.3

TEMPORAL VARIABLES

Table 54. Temporal perceptions. Cross analysis by gender Scale running from 1-definitely disagree with the statement to 5- definitely agree with the statement

Gender	Statements	heavy users (Base 76)			not/light users (Base 75)		
		Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
Male (Base 99)	One should be always punctual	4.13	4.00	.83	4.14	4.00	.87
	I do things one after another	3.35	3.50	.97	3.63	4.00	.89
	I take plans ans schedules very seriously. They can be broken only out of very serious reasons	3.97	4.00	.65	3.77	4.00	1.07
	Family and social relations are more important than job	4.05	4.00	.95	3.83	4.00	1.02
	I often feel hurried and inpatient	2.96	3.00	.86	2.79	3.00	1.02
	I enjoy working in the presence of others	3.27	3.00	1.01	2.90	3.00	.97
	I live in the present, I am not very interested in the past	3.15	3.00	1.06	3.07	3.00	1.17
	I often do plans for the future*	3.72	4.00	.79	3.37	3.50	.95
	One should be always punctual	4.22	4.00	.56	3.89	4.00	.96
Female (Base 52)	I do things one after another	3.27	3.50	1.05	3.28	3.00	.98
	I take plans ans schedules very seriously. They can be broken only out of very serious reasons	3.64	3.75	.91	3.82	4.00	.85
	Family and social relations are more important than job*	3.94	4.00	1.06	3.65	4.00	1.14
	I often feel hurried and inpatient	2.99	3.00	1.22	3.13	3.50	1.26
	I enjoy working in the presence of others	3.60	3.50	1.00	2.93	3.00	1.11
	I live in the present, I am not very interested in the past	3.35	3.25	1.36	2.70	3.00	.84
	I often do plans for the future	3.41	3.25	.81	3.55	4.00	.90

Note: * difference signif at p less than 0.05

Table 55. Temporal perceptions. Assessments of high educated respondents. Scale running from 1- definitely disagree with the statement to 5- definitely agree with the statement

High educated respondents (Base 66)	heavy users			not/light users		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
One should always be punctual	4.35	4.00	.53	3.89	4.00	1.02
I do things one after another	3.34	3.50	.98	3.51	3.75	1.01
I take plans and schedules very seriously. They can be broken only out of very serious reasons	4.00	4.00	.69	3.82	4.00	.96
Family and social relations are more important than job	3.94	4.00	.86	3.66	4.00	1.05
I often feel hurried and impatient	2.83	2.75	1.04	2.82	2.25	1.09
I enjoy working in the presence of others*	3.62	4.00	.98	3.09	3.00	.93
I live in the present, I am not very interested in the past**	3.57	4.00	1.06	2.93	3.00	.98
I often do plans for the future°	3.59	4.00	.69	3.27	3.00	.90

Note: °Sign at p less than 0.1

*sign at p less than 0.05

**sign at p less than 0.01

Table 56. Temporal perceptions. Cross analysis by employment. Scale running from 1-definitely disagree with the statement to 5- definitely agree with the statement

	heavy users (Base 76)			not/light users (Base 75)			
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation	
Work (93)	One should be always punctual	4.19	4.00	.75	4.05	4.00	.94
	I do things one after another	3.31	3.50	.93	3.55	3.63	.98
	I take plans and schedules very seriously. They can be broken only out of very serious reasons	3.98	4.00	.61	3.80	4.00	.99
	Family and social relations are more important than job	4.06	4.00	.92	3.76	4.00	1.14
	I often feel hurried and impatient	3.01	3.00	1.04	2.98	3.00	1.14
	I enjoy working in the presence of others*	3.51	3.50	1.01	2.96	3.00	.95
	I live in the present, I am not very interested in the past	3.33	3.25	1.11	3.14	3.00	.90
	I often do plans for the future*	3.68	4.00	.77	3.36	3.50	.84
	Study (41)	One should be always punctual	4.11	4.00	.77	4.00	4.00
I do things one after another		3.19	3.00	1.08	3.15	3.00	.88
I take plans and schedules very seriously. They can be broken only out of very serious reasons		3.71	4.00	.84	3.81	4.00	.76
Family and social relations are more important than job		4.11	4.25	.98	3.80	4.00	.77
I often feel hurried and impatient		3.13	3.00	.85	2.89	3.00	.91
I enjoy working in the presence of others		3.07	3.00	.97	3.10	3.00	1.12
I live in the present, I am not very interested in the past		2.83	2.00	1.27	2.60	2.00	1.14
I often do plans for the future		3.57	3.75	.78	3.55	4.00	.96

Note : °Sign at p less than 0.1 *sign at p less than 0.05 **sign at p less than 0.01

Table 57. Temporal perceptions. Cross analysis by the degree of experience- total respondents. Scale running from 1-definitely disagree with the statement to 5- definitely agree with the statement

	INDICATOR COMPRISED									Significance Kruskal Wallis
	1.less experienced			2. very experienced			3. Non user			
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	Mean	Median	Std. Dev	
One should be always punctual* (difference between groups 1-2)	3.87	4.00	.74	4.32	4.00	.67	4.06	4.00	.93	0.027
I do things one after another	3.37	3.50	1.02	3.30	3.50	.94	3.51	4.00	.95	0.495
I take plans and schedules very seriously. They can be broken only out of very serious reasons	3.65	4.00	.75	3.96	4.00	.72	3.79	4.00	1.03	0.230
Family and social relations are more important than job * (difference between groups 1-3)	4.27	4.50	.78	3.89	4.00	1.05	3.72	4.00	1.07	0.049
I am often hurried and impatient	3.10	3.00	1.05	2.93	3.00	.96	2.87	3.00	1.11	0.758
I enjoy working in the presence of others° (difference between groups 2-3)	3.19	3.00	1.09	3.43	3.00	.97	2.93	3.00	1.02	0.088
I live in the present, I am not so interested in the past	2.98	3.00	1.31	3.30	3.13	1.07	2.98	3.00	1.08	0.309
I often do plans for the future	3.62	3.75	.76	3.62	4.00	.85	3.40	3.50	.93	0.306

Note °Sign at p less than 0.1

*sign at p less than 0.05

Table 58. Temporal perceptions. Cross analysis by the degree of experience- only users (76). Scale running from 1-definitely disagree with the statement to 5- definitely agree with the statement

	Experience indicator for users (base 76)								
	Low (Base 26)			Medium (Base 29)			High (Base 21)		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
One should be always punctual * differences (1-2) (1-3)	3.87	4.00	.74	4.34	4.00	.45	4.30	4.00	.91
I do things one after another	3.37	3.50	1.02	3.27	3.50	1.01	3.35	3.50	.86
I take plans and schedules very seriously. They can be broken only out of very serious reasons.* difference (1-3)	3.65	4.00	.75	3.84	4.00	.81	4.13	4.00	.55
Family and social relations are more important than job * differences (1-2) (2-3)	4.27	4.50	.78	3.58	3.75	1.11	4.32	4.00	.80
I am often hurried and impatient	3.10	3.00	1.05	2.79	3.00	.83	3.12	3.00	1.11
I enjoy working in the presence of others	3.19	3.00	1.09	3.22	3.00	.94	3.71	4.00	.96
I live in the present, I am not so interested in the past	2.98	3.00	1.31	3.32	3.25	1.17	3.26	3.00	.94
I often do plans for the future	3.62	3.75	.76	3.48	3.50	.77	3.82	4.00	.93

Note : *sign at p les sthan 0.05

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Table 59. Communication partners over the mobile phone and SMS. Cross analysis by gender (only mobile users Base 76)

		Gender			
		Male users (Base 49)		Female users (27)	
		Responses	Column Responses %	Responses	Column Responses %
I call on mobile	family	27	39	14	50
	colleagues	14	20	3	11
	friends	25	36	9	32
	others	3	4	2	7
	Total	69	100	28	100
I'm called on mobile by...	family	25	35	10	33
	colleagues	18	25	7	23
	friends	25	35	11	37
	others	3	4	2	7
	Total	71	100	30	100
I send sms to...	family	15	28	8	32
	colleagues	13	24	2	8
	friends	23	43	11	44
	others	3	6	4	16
	Total	54	100	25	100
I receive sms from...	family	19	32	7	24
	colleagues	11	18	3	10
	friends	28	47	13	45
	others	2	3	6	21
	Total	60	100.0	29	100

Table 60. Communication partners over the fixed telephone and the e-mail. Cross analysis by usage category within gender subgroups

		gender							
		Male (Base 99)				Female (Base 52)			
		heavy user (Base 49)		not/light user (Base 50)		heavy user (Base 27)		not/light user (Base 25)	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
I call on fix..	family	31	50	26	37	14	50	17	49
	colleagues	12	19	14	20	5	18	7	20
	friends	17	27	28	40	8	29	9	26
	others	2	3	2	3	1	4	2	6
I'm called on fixed by...	family	32	53	32	48	13	50	16	48
	colleagues	10	17	8	12	3	12	5	15
	friends	15	25	24	36	9	35	10	30
	others	3	5	3	4	1	4	2	6
I send e-mail to...	family	17	27	18	24	9	26	8	25
	colleagues	19	31	18	24	6	17	9	28
	friends	23	37	37	49	15	43	13	41
	others	3	5	3	4	5	14	2	6
I receive e-mail from...	family	18	29	14	20	6	20	8	26
	colleagues	18	29	18	26	5	17	9	29
	friends	19	30	31	45	14	47	13	42
	others	8	13	6	9	5	17	1	3

Table 61. Communication partners over the fixed telephone and the e-mail. Cross analysis by gender within usage categories.

		heavy user (Base 76)				not/light user (Base 75)			
		Male (Base 49)		Female (Base 27)		Male (Base 50)		Female (Base 25)	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
I call on fix..	family	31	50	14	50	26	37	17	49
	colleagues	12	19	5	18	14	20	7	20
	friends	17	27	8	29	28	40	9	26
	others	2	3	1	4	2	3	2	6
I'm called on fixed by...	family	32	53	13	50	32	48	16	48
	colleagues	10	17	3	12	8	12	5	15
	friends	15	25	9	35	24	36	10	30
	others	3	5	1	4	3	4	2	6
I send e-mail to...	family	17	27	9	26	18	24	8	25
	colleagues	19	31	6	17	18	24	9	28
	friends	23	37	15	43	37	49	13	41
	others	3	5	5	14	3	4	2	6
I receive e-mail from...	family	18	29	6	20	14	20	8	26
	colleagues	18	29	5	17	18	26	9	29
	friends	19	30	14	47	31	45	13	42
	others	8	13	5	17	6	9	1	3

Table 62. Communication partners over the mobile phone (conversation and SMS). Cross analysis by age within the user sub-sample (Base 76)

		NTILES of AGF1.1					
		up to 27 (Base 28)		28-37 (Base 28)		38-65 (Base 20)	
		Count	Column %	Count	Column %	Count	Column %
I call on mobile	family	12	39	15	48	14	40
	colleagues	4	13	3	10	10	29*
	friends	13	42	11	35	10	29
	others	2	6	2	6	1	3
I'm called on mobile by...	family	13	36	11	33	11	34
	colleagues	8	22	7	21	10	31
	friends	14	39	12	36	10	31
	others	1	3	3	9	1	3
I send sms to...	family	8	28	6	22	9	39
	colleagues	6	21	5	19	4	17
	friends	12	41	14	52	8	35
	others	3	10	2	7	2	9
I receive sms from...	family	7	21	9	29	10	42
	colleagues	6	18	5	16	3	13
	friends	16	47	16	52	9	38
	others	5	15	1	3	2	8

Note: difference sign. at p less than 0.05

Table 63. Communication partners over the fixed telephone and the e-mail. Cross analysis by technology usage within age sub-samples

		NTILES of AGF1.1											
		Up to 27 (Base 50)		28-37 (Base 52)		38-65 (Base 49)							
		heavy user (28)	not/light user (22)	heavy user (28)	not/light user (24)	heavy user (20)	not/light user (29)						
		Count	Column %	Count	Column %	Count	Column %						
I call on fixed...	family	12	40	13	41	21	60	16	42	12	48	14	40
	colleagues	5	17	8	25	5	14	9	24	7	28**	4	11
	friends	11	37	11	34	8	23	12	32	6	24	14	40
	others	2	7			1	3	1	3			3	9
I'm called on fixed by...	family	13	42	19	59*	19	68	13	41	13	48	16	44
	colleagues	4	13	4	13	3	11	4	13	6	22	5	14
	friends	11	35	9	28	5	18	15	47	8	30	10	28
	others	3	10			1	4					5	14
I send e-mail to...	family	7	20	8	28	13	37	8	23	6	22	10	23
	colleagues	9	26	5	17	10	29	9	26	6	22	13	30
	friends	16	46	14	48	10	29	17	49*	12	44	19	43
	others	3	9	2	7	2	6	1	3	3	11	2	5
I receive e-mail from...	family	6	18	6	25	13	37	7	22	5	21	9	20
	colleagues	7	21	3	13	10	29	11	34	6	25	13	30
	friends	15	44	12	50	8	23	13	41*	10	42	19	43
	others	6	18	3	13	4	11	1	3	3	13	3	7

Note: * difference sign at p less than 0.05

** difference sign at p less than 0.01

Table 64. Communication partners over the mobile phone (conversation and SMS). Cross analysis by usage experience within the user sub-sample (Base 76)

		NTILES of DEGREXP					
		Low (Base 26)		Medium (Base 29)		High (Base 21)	
		Count	Column %	Count	Column %	Count	Column %
I call on mobile	family	15	48	15	44	11	34
	colleagues	3	10	7	21	7	22
	friends	11	35*	10	29	13	41*
	others	2	6	2	6	1	3
I'm called on mobile by...	family	11	34	13	37	11	32
	colleagues	6	19	8	23	11	32
	friends	14	44	11	31	11	32
	others	1	3	3	9	1	3
I send sms to...	family	6	30	7	23	10	34
	colleagues	2	10	5	17	8	28
	friends	10	50	14	47	10	34
	others	2	10	4	13	1	3
I receive sms from...	family	7	28	9	26	10	33
	colleagues	3	12	2	6	9	30
	friends	12	48	18	53	11	37
	others	3	12	5	15		
I call on fix..	family	14	40	16	59	15	54
	colleagues	7	20	5	19	5	18
	friends	12	34	5	19	8	29
	others	2	6	1	4		
I'm called on fixed by...	family	14	47	17	63	14	48
	colleagues	5	17	3	11	5	17
	friends	9	30	5	19	10	34
	others	2	7	2	7		
I send e-mail to...	family	12	34	5	15	9	32
	colleagues	8	23	8	24	9	32
	friends	12	34	16	47	10	36
	others	3	9	5	15		
I receive e-mail from...	family	9	27	5	17	10	33
	colleagues	7	21	7	23	9	30
	friends	12	36	13	43	8	27
	others	5	15	5	17	3	10

Note: * difference sign at p less than 0.05

QUESTIONNAIRE (PRINT VERSION OF THE ONLINE FORM)

EINFÜHRUNG

Vielen Dank, dass Sie bereit sind, diesen Fragebogen auszufüllen. Sie unterstützen uns damit bei unserer Forschungsarbeit.

Das Graduiertenkolleg Technisierung und Gesellschaft der Technischen Universität Darmstadt führt zur Zeit eine WWW-Befragung zum Thema 'Technisierung der Kommunikation' durch. Die Befragung findet im Rahmen eines Promotionsprojektes zur Erforschung der Kommunikationstechnologien statt. Im Folgenden möchten wir Sie bitten, einige Fragen zu Ihrer Nutzung der verschiedenen Kommunikationsmedien zu beantworten. Wir versichern Ihnen, daß keinerlei Verbindung zur Kommunikationsindustrie besteht und wir keine Daten an die Industrie weitergeben werden. Ihre Angaben werden anonym behandelt!

Sektion 1

1.1. Alter _____

1.2. Geschlecht

- 1 Männlich
- 2 Weiblich

1.3. Haben Sie ein eigenes Handy für den privaten Gebrauch?

- 1 Ja
- 2 Nein

Wenn Sie kein Handy besitzen, gehen Sie zur Frage 1.6.

1.4. Wie oft benutzen Sie Ihr Handy?

- 1. Sehr selten, fast nie
- 2. Selten, nur auf Reisen
- 3. Mindestens 1-3mal im Monat
- 4. Mindestens 1-3mal in der Woche
- 5. Sehr oft, mehrmals täglich

1.5. Seit wieviel Zeit besitzen Sie Ihr Handy ?

Seit _____ Jahre _____ Monaten

1.6. Welchen allgemeinbildenden Schulabschluß haben Sie?

- 1. Noch Schüler
- 2. Hauptschulabschluß
- 3. Mittlere Reife/Realschul- oder Fachschulabschluß
- 4. Abitur/Fachabitur/Höhere Handelsschule
- 5. Abgeschlossenes Studium
- 6. Kein Schulabschluß
- 7. Keine Angabe

1.7. Sind Sie zur Zeit berufstätig?

- 1. voll berufstätig
- 2. teilweise berufstätig (halbtags, stundenweise)
- 3. in Berufsausbildung
- 4. Hausfrau/-mann
- 5. Schüler/in
- 6. Student/in
- 7. Rentner/in
- 8. nicht berufstätig/arbeitsuchend

1.8. Welchen Beruf üben Sie aus?

Sektion 2

Jetzt einige Fragen über Ihre Wege und Kommunikationsmittel im Alltag

2.1. Wie lange sind Sie durchschnittlich unterwegs (Auto, Bahn, Flugzeug, Fahrrad, Bus, etc.) ?

Pendlerfahrten (Stunden pro Tag) _____
unregelmäßige berufbedienste Reisen/Fahrten (Stunden pro Tag) _____
Urlaubreisen(Tage/Jahr) _____
andere private Fahrten (Tage/Jahr) _____

**2.2. Wie oft fahren sie üblicherweise zu den folgenden Orten?
(durchschnittliche Entfernung)**

	Nie	Seltener	1-3 Mal im Monat	1-3 mal in der Woche	sehr oft, täglich	weiß nicht
In der unmittelbaren Nachbarschaft	5	4	3	2	1	0
Im gleichen Stadtbezirk	5	4	3	2	1	0
In der gleichen Stadt	5	4	3	2	1	0
Im Bundesland und zwar _____	5	4	3	2	1	0
Im Bundesgebiet	5	4	3	2	1	0
Im Ausland und zwar _____	5	4	3	2	1	0

Dann einige Fragen über die Kommunikationsmittel im Alltag

2.3. Wie viele Telefonanschlüsse (Mobiltelefone, Festnetzanschlüsse) haben Sie?

Mehrfachnennungen

1. Einen Hauptanschluß Festnetz
2. Zwei und mehr Hauptanschlüsse (Festnetz)
3. Einen Nebenanschluß (Festnetz)
4. Zwei und mehr Nebenanschlüsse (Familientelefon)
5. Ein Mobiltelefon
6. Mehr Mobiltelefone und zwar _____
7. Einen mobilen Anschluß im Haus (z.b. Genion Home)

Wenn Sie kein Handy benutzen, gehen Sie zur Frage 2.12.

Bitte beschreiben Sie Ihr Handy:

2.4. Marke Ihres Handys: _____

2.5. a Art des Vertrages

1. Vertrag
2. Prepaid-Karte
3. Anders und zwar _____

2.5.b. Andere Bemerkungen (Variant: Home, City, etc.) _____

2.6. Das Handy hat verschiedene Merkmale und Funktionen. Wie häufig benutzen Sie die folgenden Funktionen am Handy?

	Es gibt keine Funktion	Es gibt die Funktion, aber ich habe sie nie benutzt	Seltener als einmal pro Monat	1-3mal im Monat	1-3mal in der Woche	sehr oft, mehrmals täglich
Einfache Gesprächsanwendung	0	5	4	3	2	1
Überprüfen des Anrufbeantworters (Mobilbox)	0	5	4	3	2	1
Erstellen /lesen einer SMS Nachricht	0	5	4	3	2	1
Telefonbuch	0	5	4	3	2	1
Uhr	0	5	4	3	2	1
Ruftöne	0	5	4	3	2	1
Wahlwiderholung	0	5	4	3	2	1
Kalender	0	5	4	3	2	1
Termine (Erinnerung)	0	5	4	3	2	1
Ausgegangene/eingegangene Anrufe	0	5	4	3	2	1
Kurzwahl	0	5	4	3	2	1
Vibrationsalarm	0	5	4	3	2	1
Tastensperre	0	5	4	3	2	1
Rechner	0	5	4	3	2	1
Internetzugang	0	5	4	3	2	1
E-mail im Internet						
Datenverkehr: Datei schicken und bekommen	0	5	4	3	2	1
Spiele	0	5	4	3	2	1
Mp3-player	0	5	4	3	2	1
Telefonumleitung	0	5	4	3	2	1
Konferenz	0	5	4	3	2	1
Navigations- bzw. Orientierungssystem	0	5	4	3	2	1
Menü "Im Gespräch"/Gesprächsführung Optionen	0	5	4	3	2	1
SMS Chat	0	5	4	3	2	1
Andere und zwar	0	5	4	3	2	1

(In analysis scales were reversed 5 correspondes to the best option)

2.7. Welche dieser Anwendungen des Handys erscheinen Ihnen am wichtigsten?

Liste von oben anschauen

2.8. Welche dieser Anwendungen des Handys erscheinen Ihnen am wenigsten wichtig? Die

2.9. Wieviel telefonieren Sie mit Ihrem Handy zu den verschiedenen Tageszeiten ...?

Stellen Sie sich vor, daß alle Anrufe an einem Tag 100% sind, und geben Sie die Anteile im Prozenten für die Anrufe...

	Prozent 100%
morgens	
mittags	
nachmittags	
abends	
nachts	

2.10. An welchem Ort befinden Sie sich meistens beim Telefonieren mit dem Handy? Und Ihr privater Handy-Gesprächspartner, mit dem Sie am häufigsten in Kontakt treten?

Mehrfachnennungen

	Sie	der Gesprächspartner
Zu Hause	1	1
Am Arbeitsplatz/Studiumsplatz	2	2
Unterwegs in der Stadt, im Laden	3	3
Unterwegs, auf dem Land, im Freien	4	4
Im Auto/Zug	5	5
In einem anderen Ort und zwar	6	6

2.11. Nutzen sie Ihr privates Handy auch beruflich/dienstlich?

1. Nein
2. Ja, aber überwiegend privat
3. Ja, hauptsächlich beruflich/dienstlich
4. Ja, zu gleichen Teilen
5. Weiß nicht
6. Keine Angabe

2.12. Was würden Sie sagen, mit wem telefonieren (sprechen) Sie am meisten?

Wenn Sie kein Handy besitzen, fühlen Sie nur die ersten zwei Spalten aus.

	Ich telefoniere mit...		Ich werde von... angerufen	
	Am Festnetz	Am Handy	Am Festnetz	Am Handy
Familie und Verwandte	01	01	01	01
Arbeitskollegen	02	02	02	02
Freunde	03	03	03	03
Sonstige und zwar	04	04	04	04

2.13 Was würden Sie sagen, mit wem kommunizieren Sie am meisten per E-mail, SMS?

Wenn Sie kein Handy besitzen, fühlen Sie nur die ersten zwei Spalten (Kommunizieren per E-mail) aus.

	Ich sende Nachrichten an...		Ich kriege Nachrichten von...	
	E-mail (Computer)	SMS (Handy)	SMS (Handy)	E-mail (Computer)
Familie und Verwandte	01	01	01	01
Arbeitskollegen	02	02	02	02
Freunde	03	03	03	03
Sonstige und zwar	04	04	04	04

2.14. Steht Ihnen ein Zugang zum Internet zur Verfügung?

1. Ja, privat
2. Ja, beruflich
3. Beides
4. Kein Zugang zum Internet

2.15. Welche der in der Tabelle aufgeführten Medien und Wege zur Kommunikation treffen am besten auf die folgenden Situationen zu?

Bitte wählen Sie alle passenden Medien für jede Situation aus. Berücksichtigen Sie alle Medien und Kommunikationsformen, auch wenn Sie kein Handy, Fax, etc. besitzen

Mehrfachnennungen

	Gespräch Von Angesicht zu Angesicht	Internet chat	Gespräch im Festnetz	Gespräch mit dem Handy	SMS /E-mail per Handy	Fax	Briefe	E-mail (Computer)	Keine von diesen
Lust zu kommunizieren									
Sex Calls									
Erkundigung, ob alles in Ordnung ist bzw. ob es etwas neues gibt									
Termine/Verabredungen absagen									
Termine/Verabredungen vereinbaren									
Bankdienste/Finanzberatung									
Einladungen aussprechen									
konkretes Arbeitsproblem lösen									
kurze Nachrichten mitteilen									
schlechte Nachricht mitteilen									
Kartenvorverkauf (Fahrkarten, Eintrittskarten)									
jmd. einen Streich spielen, Witze machen									
über Filme, Musik unterhalten									
sich erkundigen nach verschiedenen Produkten									
über Liebe sprechen/Flirten									
Polizei oder Krankenhaus im Notfall kontaktieren									
sich entschuldigen									
Wenn man neugierig ist, wie es seinen Freunden geht									
Wenn man reist bzw. unterwegs ist und die besorgte Familie beruhigen möchte									
Einkaufen/Online Bestellung/Bestellung									
jemandem kurz begrüßen/gratulieren									
eine gute Nachricht mitteilen									
eine Fahrt/Reise planen									

2.16. Bitte denken Sie an die letzten Male, als Sie unterwegs waren und das Handy /das Festnetz benutzt haben. Hat das Handy/Festnetz Ihre Wege beeinflusst?

Wenn Sie kein Handy besitzen, beantworten Sie nur die Festnetzfragen

	Der Telefonanruf machte einen Weg erforderlich	Der Anruf änderte einen bereits begonnenen Weg	Der Anruf machte einen Weg unnötig, sparte den Weg	Keine Auswirkung
Handybenutzung 1	1	2	3	4
Handybenutzung 2	1	2	3	4
Handybenutzung 3	1	2	3	4
Festnetzgespräch 1	1	2	3	4
Festnetzgespräch 2	1	2	3	4
Festnetzgespräch 3	1	2	3	4

Sektion 3:

Denken Sie jetzt bitte an den Inhalt Ihrer Gespräche

3.1. Worüber diskutieren Sie am häufigsten, wenn Sie sich von Angesicht zu Angesicht mit Freunden, Verwandten unterhalten? Was sind die Gesprächsthemen?

Wenn Sie kein Handy besitzen, gehen Sie zur Sektion 4, Frage 4.1.

3.2. Worüber sprechen Sie am Handy? Was sind die Gesprächsthemen?

3.3. Über welche Inhalte sprechen Sie nicht am Handy?

3.4. Wie lange dauert durchschnittlich Ihr Gespräch am Handy?

_____ Minuten

3.5. Während eines Handygespräches können Sie das Handymenü "Im Gespräch" öffnen. Einige Optionen stehen, abhängig von der jeweiligen Gesprächssituation, zur Verfügung. Welche der folgenden Optionen haben Sie jemals benutzt?

Bitte kreuzen Sie alle benutzten Optionen an

1. Ruf makeln (damit wird der aktive Anruf zu einer gehaltenen Verbindung)
2. Meine Nummer nicht zeigen
3. Gespräche wechseln (wechselt zwischen dem aktiven und dem gehaltenen Anruf)
4. Konferenzgespräch (schaltet das aktive Gespräch mit dem gehaltenen Anruf zusammen)
5. Anruf weiterbinden
6. Teilnehmer abtrennen (damit können Sie bei einem Konferenzgespräch mit einem Teilnehmer allein sprechen)
7. Anklopfen abweisen
8. Neuer Anruf (Sie können ein weiteres Handygespräch führen)
9. andere Option und zwar _____

3.6. Was sind die häufigsten Themen beim Unterhalten/Kommunizieren per SMS?

Sektion 4:

Viele Leute haben besondere Empfindungen, wenn sie verschiedene Kommunikationsmedien benutzen. Denken Sie jetzt bitte an Ihre Empfindungen bei der Nutzung der verschiedenen Kommunikationsmitteln

4.1. Stellen Sie sich eine gewöhnliche Unterhaltung mit Freunden oder Verwandten vor.

Bitte wählen sie alle Kommunikationsformen aus, bei denen Sie die in der Tabelle aufgeführten Empfindungen haben.

Bitte kreuzen Sie die passenden Kommunikationsformen an . Wenn Sie kein Handy besitzen, fühlen Sie die Spalten mit Handy und SMS nicht aus.

	Von Angesicht zu Angesicht	E-mail	Festnetzgespräch	Handygespräch	SMS	Briefe	Keine von diesen
Ich fühle mich frei, alles besprechen und machen zu können							
Ich fühle mich mächtig, ich kontrolliere die Gesprächsführung							
Ich fühle mich belästigt, angestrengt							
Macht mir wirklich Spaß							
Ich fühle mich dem Gesprächspartner näher							
Ich bin hastig und ungeduldig							
Ich fürchte, daß sich etwas Unangenehmes ereignen wird							
Ich kann den Partner völlig verstehen							
Ich fühle mich unter Druck, unbedingt antworten zu müssen.							

4.2 Jetzt stellen sie sich eine offizielle Situation (Am Arbeitsplatz, bei der Behörde) vor. Bitte wählen sie alle Kommunikationsformen aus, bei denen Sie die in der Tabelle aufgeführten Empfindungen haben.

Bitte kreuzen Sie die passenden Kommunikationsformen an . Wenn Sie kein Handy besitzen, fühlen Sie die Spalten mit Handy und SMS nicht aus.

	von Angesicht zu Angesicht	E-mail	Festnetzgespräch	Handygespräch	Briefe	Keine von diesen
Ich fühle mich frei, alles besprechen und machen zu können						
Ich fühle mich mächtig, ich kontrolliere die Gesprächsführung						
Ich fühle mich belästigt, angestrengt						
Macht mir wirklich Spaß						
Ich fühle mich dem Gesprächspartner näher						
Ich bin hastig und ungeduldig						
Ich fürchte, daß sich etwas Unangenehmes ereignen wird						
Ich kann den Partner völlig verstehen						
Ich fühle mich unter Druck, unbedingt antworten zu müssen.						

4.3. Angenommen, Sie können per Bild- Mobiltelefon Ihren Gesprächspartner beim Telefonieren sehen: Würden Sie sich darauf freuen?

1. Nein
2. Teils/Teils
3. Ja
4. Weiß nicht
5. Keine Angabe

4.4. Warum?

Sektion 5 Jetzt einige Fragen über ihre Meinungen zur Zeit- und Lebensplanung, Handys und Handybenutzer

5.1. Inwieweit stimmen Sie den folgenden Aussagen zu?

	stimme überhaupt nicht zu	stimme nicht zu	stimme weder/noch zu	stimme zu	stimme völlig zu	Weiß nicht
Man soll immer pünktlich sein	5	4	3	2	1	0
Ich tue eins nach dem anderen	5	4	3	2	1	0
Ich nehme die Zeitpläne und Termine sehr ernst. Sie dürfen nur aus wichtigsten Gründen nicht eingehalten werden	5	4	3	2	1	0
Die Familie und die sozialen Beziehungen sind wichtiger als die Arbeit	5	4	3	2	1	0
Ich bin oft eilig, ungeduldig	5	4	3	2	1	0
Ich bevorzuge es, mit vielen Leuten gleichzeitig zu arbeiten	5	4	3	2	1	0
Ich lebe in der Gegenwart, ich bin nicht so interessiert an der Vergangenheit.	5	4	3	2	1	0
Ich mache oft Zukunftspläne	5	4	3	2	1	0
Ich kann mich sehr gut in der Stadt oder anderswo orientieren	5	4	3	2	1	0
Ich bin oft unterwegs, reise immer mehr	5	4	3	2	1	0

(scales reversed in analysis 5-the best option)

5.2. Wir bitten Sie jetzt, auf einigen Fragen über Ihre Einstellungen gegenüber Handys und Handybenutzer zu antworten. Welchen dieser Aussagen stimmen Sie zu?

	stimme zu	stimme nicht zu	Weiß nicht
Die Handybenutzer sind lästig	1	2	0
Am Handy scheinen sich große Distanzen zu verringern. Man fühlt sich dem Gesprächspartner näher	1	2	0
Handybenutzer sind moderne Leute	1	2	0
Wer Erfolg haben will, soll ein Handy benutzen	1	2	0
Handybenutzer scheinen immer in Eile zu sein	1	2	0
Handys sind besonders geeignet für Geschäftsleute	1	2	0
Handys sind besonders geeignet für Teenagers	1	2	0
Handys sind besonders geeignet für aktive Leute	1	2	0
Handys sind gefährlich für die Gesundheit	1	2	0
Handys sind komplizierte Geräte, und daher schwierig zu benutzen	1	2	0
Handybenutzer planen ihr Leben besser.	1	2	0
Handys dürfen an öffentlichen Orten nicht benutzt werden.	1	2	0
Handys sind besonders geeignet für die Unterhaltung mit Verwandten oder Familienangehörigen	1	2	0
Handys sind besonders geeignet für Arbeitsgespräche	1	2	0
Handybenutzer haben mehr Freunde als die Nicht-Benutzer	1	2	0
Das Handy bringt Leute zusammen	1	2	0
Handys sind besonders geeignet für die alten Leute	1	2	0

Q5.3. Was würden sie an Neuerungen bei den Kommunikationsmitteln wünschen? Was vermissen Sie?

Sektion 6:

Zum Schluß noch ein Paar Fragen zu Ihrer Person

6.1. Familienstand:

1. ledig
2. verheiratet/zusammenlebend
3. geschieden/getrennt lebend
4. verwitwet

6.2. Über welches monatliche Haushaltseinkommen verfügen Sie?

_____ Euro

6.3. Wie viele Personen leben in Ihrem Haushalt?

_____ Personen

6.4. Sind Sie Mitglied eines Vereins?

1. Nein
2. Ja, und zwar _____

6.5 In welchem Bundesland leben Sie? _____

6.6. Ihr Wohnort _____

Danke Schön!

ENGLISH TRANSLATION OF THE QUESTIONNAIRE

Thank you for your willingness to fill this questionnaire. You help us very much in our research.

The Post-graduate School Technification and Society, Darmstadt conducts a WWW Survey about technification of communication. The study is carried out within a doctoral thesis dealing with communication technologies. In the following, I would like to ask you to answer some questions about your usage of various communication media. I assure you that this study is totally unrelated to the industry of communication technologies, and no data will be gathered out of commercial/marketing purposes or transmitted to industry. Your answers remain anonymous!

Section 1

1.1. Age _____

1.2. Gender

- 1 Male
- 2 Female

1.3. Do you own a mobile phone for private use?

- 1 Yes
- 2 No

If you have a mobile phone, go to question 1.6.

1.4. How often do you use your mobile phone?

- 6. Very rarely, almost never
- 7. Seldom, only while travelling
- 8. At least 1-3 times a month
- 9. At least 1-3 times a week
- 10. Very often, several times a day

1.5. For how long have you been using your mobile phone?

For _____ Years _____ Months

1.6. Which is the highest level of completed education?

- 8. Still pupil
- 9. CSE
- 10. Secondary school level I
- 11. Final secondary school
- 12. University
- 13. No education
- 14. No answer

1.7. What is your work status?

- 1. Full-time employee
- 2. Part-time employee
- 3. In vocational training
- 4. Housewife/man
- 5. Pupil
- 6. Student
- 7. Retired
- 8. Not employed yet

1.8. Which is your occupation?

Section 2

Now some questions about hour travel and communication habits

2.1. How much time do you usually spend on the way? (in the car, train, bus, bicycle, by foot etc.) ?

commuting travel (hours /day) _____
irregular professional travel (hours /day) _____
holiday travel(days/year _____
other private travel (days/year) _____

2.2. How long do you usually travel to the following destinations?
(medium distance)

	Never	Seldom	1-3 times a month	1-3 times a week	very often, daily	don't know
In the close neighborhood	5	4	3	2	1	0
In the same city area	5	4	3	2	1	0
In the same city	5	4	3	2	1	0
In the federal state	5	4	3	2	1	0
In the federal territory	5	4	3	2	1	0
Abroad	5	4	3	2	1	0

Now several questions about the daily communication media and forms

2.3. How many telephone connections (mobile, fixed telephone lines) do you have in your household?
Mehrfachnennungen

- 8. One fixed connection
- 9. Two or more main fixed connections
- 10. One fixed telephone extension
- 11. Two or more fixed telephone extensions (Family telephone)
- 12. One mobile phone
- 13. More mobile phones. Please specify the number _____
- 14. One mobile connection to be used as fixed connection (for example Genion Home)

If you don't have a mobile phone, go to question 2.12.

Please shortly describe your mobile phone:

2.4. Brand: _____

2.5. a Type of payment

- 1.Contract
- 2.Prepaid-Card
- 3.Other. Please specify _____

2.5.b. Other variants (Variant: Home, City, etc.) _____

2.6. The mobile phone has more functions and applications. How often do you use the following functions and applications of the mobile phone?

	No function	The application exists, but I've never used it	Rarer then once a month	1-3 times a month	1-3 times a week	very often, several times a day
Verbal telephony	0	5	4	3	2	1
Mobilbox	0	5	4	3	2	1
SMS	0	5	4	3	2	1
Phone directory	0	5	4	3	2	1
Clock	0	5	4	3	2	1
Ring tones	0	5	4	3	2	1
Redial	0	5	4	3	2	1
Calendar	0	5	4	3	2	1
Agenda	0	5	4	3	2	1
Last calls	0	5	4	3	2	1
One touch	0	5	4	3	2	1
Vibrate mode	0	5	4	3	2	1
Key lock	0	5	4	3	2	1
Calculator	0	5	4	3	2	1
Internet	0	5	4	3	2	1
Data transfer						
E-mail on the Internet	0	5	4	3	2	1
Games	0	5	4	3	2	1
Mp3 player	0	5	4	3	2	1
Call forwarding	0	5	4	3	2	1
Multi-party calls	0	5	4	3	2	1
Navigation/GPS	0	5	4	3	2	1
<i>Im Gespräch</i>	0	5	4	3	2	1
SMS Chat	0	5	4	3	2	1
Other	0	5	4	3	2	1

(In analysis scales were reversed. 5 correspondes to the best option)

2.7. Which of the mobile phone applications are the most important for you?

2.8. Which of the mobile phone applications are the least important for you?

2.9. How much do you talk on the mobile phone in the morning, mid-days, in the afternoon, in the evening, nights?

Please give answers in percents, so that their sum adds to 100

	Percent 100%
in the morning	
mid-days	
in the afternoon	
in the evening	
nights	

2.10. Where are you when you usually talk on your mobile phone? But your most often private partner?

Multiple answers

	Sie	der Gesprächspartner
Home	1	1
At the office/studying place	2	2
Outdoor in the city	3	3
Outdoor, in the forest, at the countryside	4	4
In the car/train	5	5
In another place. Please specify	6	6

2.11. Do you use your private mobile phone also for work tasks?

1. No
2. Yes, but mostly private
3. Yes, usually for professional tasks
4. Yes, equally in the private and work life
5. Don't know
6. No answer

2.12. Who is your typical conversation partner in string phone conversation? But in mobile phone conversation?

If you don't have a mobile phone fill only the columns referring to the fixed phone.

	I call ...		I am called by....	
	<i>Fixed phone</i>	Mobile phone	<i>Fixed phone</i>	Mobile phone
Family and relatives	01	01	01	01
Work colleagues	02	02	02	02
Friends	03	03	03	03
Others. Please specify	04	04	04	04

2.13 Who is your typical partner in e-mail communication? But in SMS exchange?

If you don't have a mobile phone fill only the columns referring to thee-mail.

	I send messages to...		I receive messages from...	
	E-mail (Computer)	SMS (Handy)	SMS (Handy)	E-mail (Computer)
Family and relatives	01	01	01	01
Work colleagues	02	02	02	02
Friends	03	03	03	03
Others. Please specify	04	04	04	04

2.14. Do you have an Internet connection?

5. Yes, privat
6. Yes, professional
7. Both
8. No access to Internet

2.15. Which of the communication media and forms from the table below are suitable for the usage in the following situations?

Please mark the suitable media or forms for each situation, even if you don't own a mobile phone, fax, etc.

Multiple ticks possible

	Face-to-face conversation	Internet chat	classical telephony	mobile telephony	SMS communication	Fax	Letters	E-mail (Computer)	None of these
Desire/impulse to communicate									
Sex Calls									
Anxious to know if everything is all right									
Canceling of appointments									
Making appointments									
Banking									
Making invitations									
Solving a work problem									
Communicating short information									
Sending bad news									
Booking tickets									
Playing tricks, making jokes									
Talking about films, music									
Asking for information about various products									
Talking about love/flirting									
Police or hospital calling in emergency									
Apologizing									
Curiosity about what's new about friends									
Reassuring the worried family while travelling									
Shopping/Buying/Ordering									
Greeting/Congratulating									
Sending good news									
Planning a trip									

2.16. Which effects does the usage of the mobile phone/string phone have on the organization of private/professional travel? Please think at your last three calls on mobile, respectively fixed phone...

If you don't have a mobile phone, answer only the questions about fixed phone calls

	The call initiated a route	The call changed a route already initiated	The call saved travel	No effect
Mobile call 1	1	2	3	4
Mobile call 2	1	2	3	4
Mobile call 3	1	2	3	4
Fixed phone call 1	1	2	3	4
Fixed phone call 2	1	2	3	4
Fixed phone call 3	1	2	3	4

Section 3:

Think about the content of your conversations...

3.1. What do you discuss most often, when you engage in face to face conversation with friends, relatives? What are the typical conversation issues?

If you don't have a mobile phone, go to Section 4, Question 4.1.

3.2. What do you discuss on the mobile phone? What are the typical issues?

3.3. About what do you avoid to discuss on the mobile phone?

3.4. How long is your typical mobile phone conversation?(average minutes)
_____ Minutes

3.5. During a mobile call you can open the menu "Im Gespräch". You have there several options. Which of them have you ever used?

Please mark all the used options

1. The active call becomes a hold call
2. Hide the number
3. Change conversations between active and hold
4. Conference (active call together with hold call)
5. Further connect the call
6. One partner is cutt of, so that you can talk only with one partner in a conference call
7. Entering rejection
8. New call (You can conduct a new call while phoning)
9. Other option. Please specify _____

3.6. What are the usual issues when you send SMS?

Section 4:

Many people have particular sensations when they use various communication media. Please think about what do you feel when you use various communication media and forms.

4.1. Please imagine an usual, informal communication with family members, friends, acquaintances. What do you feel when you use the communication media and forms listed in this table?

Please tick all the suitable communication forms for each sensation. If you don't have and use a mobile phone, please don't fill the corresponding columns for mobile telephony and SMS exchange.

	Face-to-face	E-mail	Classical telephony	Mobile telephony	SMS	Letters	None of these
I feel free to do anything and to talk about everything							
I feel powerful; I am the one who controls the conversation							
I feel tense, stressed							
I really enjoy it							
I feel closer to the conversation partner							
I feel hectic and impatient							
I am afraid that something unpleasant is going to happen							
I can fully understand what the partner means							
I feel compelled to answer.							

4.2 Please imagine a formal communication situation (at the work place, public authorities, etc.) What do you feel when you use the communication media and forms listed in this table?

Please tick all the suitable communication forms for each sensation. If you don't have and use a mobile phone, please don't fill the corresponding columns for mobile telephony exchange.

	Face-to-face	E-mail	Classical telephony	Mobile telephony	Letters	None of these
I feel free to do anything and to talk about everything						
I feel powerful; I am the one who controls the conversation						
I feel tense, stressed						
I really enjoy it						
I feel closer to the conversation partner						
I feel hectic and impatient						
I am afraid that something unpleasant is going to happen						
I can fully understand what the partner means						

I feel compelled to answer						
----------------------------	--	--	--	--	--	--

4.3. Let's suppose that you could see your partner while conducting a call on a video mobile telephone. Would you be happy about it?

1. No
2. Only partially
3. Yes
4. Don't know
5. No answer

4.4. Why?

Section 5:

Now several questions about your opinions about your time and life planning, mobile phones and their users.

5.1. To what extent do you agree with the following statements?

	Completely disagree	Disagree	Nor disagree/neither agree	Agree	Completely agree	Don't know
One should always be punctual	5	4	3	2	1	0
I do things one after another	5	4	3	2	1	0
I take schedules very seriously. They can be broken only put of very serious reasons	5	4	3	2	1	0
Family and social relations are more important for me than profession	5	4	3	2	1	0
I am often hurried and impatient	5	4	3	2	1	0
I prefer to work in the presence of other persons	5	4	3	2	1	0
I live in the present, I am not so interested in the past.	5	4	3	2	1	0
I make often plans for the future	5	4	3	2	1	0
I can orient myself very well in the city or elsewhere	5	4	3	2	1	0
I am always on the way, I travel more and more	5	4	3	2	1	0

(scales reversed in analysis. 5 - the best option)

5.2. To what extent do you agree/disagree with the following statements?

	agree	disagree	Don't know
Mobile phone users are annoying	1	2	0
When you talk on the mobile phone you have the impression that distances become shorter. You feel closer to the partner	1	2	0
Mobile users are modern	1	2	0
Who wants to have success has to use a mobile phone	1	2	0
Mobile users are hurried persons	1	2	0
Mobile phones are particularly suitable for businessmen	1	2	0
Mobile phones are particularly suitable for teenagers	1	2	0
Mobile phones are particularly suitable for active people	1	2	0
Mobile phones are dangerous for health	1	2	0
Mobile phones are complicated, difficult to use devices	1	2	0

Mobile phones users plan better their lives.	1	2	0
Mobile phones must not be used in public places.	1	2	0
Mobile phones are particularly suitable for conversation with family members or relatives	1	2	0
Mobile phones are particularly suitable for work conversations	1	2	0
Mobile phone users have more friends than non-users	1	2	0
The mobile phone connects people	1	2	0
Mobile phones are particularly suitable for old persons	1	2	0

Q5.3. Would you like something new in the field of communication media? What would you miss/expect?

Section 6:

In the end, several questions about yourself

6.1. Family status

1. single
2. married/living together
3. divorced/living separately
4. widow

6.2. What is your monthly household income ?

_____ Euro

6.3. How many persons live in your household?

_____ Persons

6.4. Are you a club member?

3. No
4. Yes. Please specify _____

6.5. In what federal state do you live? _____

6.6. Your place of residence _____

Thank you!

Oana Stefana Mitrea

Personal data

Date and place of birth 03. 03.1973, Baia Mare, Romania

Nationality Romanian

Education

10/1991 - 07/1996 Diploma in sociology from the University of Bucharest, Faculty of Sociology and Psychology

10/1996 - 07/1997 Master degree in Sociology from the University of Bucharest, Faculty of Sociology

Thesis: *“Symbolism and Influence Tactics in Persuasive Communication and Advertising”*

11/1997 - 01/2002 Doctor in Sociology, University of Bucharest, Romania

Thesis: *„Modele simbolice ale comunicarii publicitare“*

01/2001- 02/2005 Ph.D. candidate at Darmstadt University of Technology, Germany fellow of at the Graduate School “Technification and Society”

Thesis: *“Understanding the usage patterns of mobile telephony- The Rise of the Mobile Communication Dispositif”*

Research experience/Employment

09/1995 - 04/2000 Research project manager at the Romanian Institute for Public Opinion (IRSOP) Bucharest

01/2001 - 12/2003 Fellow of the Post-Graduate School „Technification and Society“, TU Darmstadt

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Oana Stefana Mitrea

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10.1991 – 07.1996 Studium der Soziologie an der Universität Bukarest, Fakultät für Soziologie, Psychologie und Pädagogik
Schwerpunkte: Kommunikationssoziologie, Soziale Psychologie
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10.1996 – 07.1997 Master-Studium der Soziologie an der Universität Bukarest, Fakultät für Soziologie, Psychologie und Pädagogik
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11.1997 – 01.2002 Promotion an der Universität Bukarest
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