

SECTION II

VIRTUAL REALITY IN COMMUNICATION: HUMAN FACTORS AND APPLICATIONS

Virtual Reality can be described as an advanced communication tool: a communication interface in single-user VR, and a communication medium in the case of multi-user VR. This leads us to propose a *cultural* concept of presence as a social construction. Lying at the base of this view are two elements which guarantee an elevated sense of presence: a *cultural framework* and the possibility of *negotiation*, both of actions and of their meaning.

Riva and Mantovani, 2000

2 Virtual Communication: social interaction and identity in an electronic environment

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Abstract: Although Computer Mediated Communication (CMC) is not a novelty, its current spread is casting a blaze of light on the new environments created by electronic communications. Trying to understand the characteristics of CMC and its effects on people, groups and organizations, the chapter outlines a framework for the study of computer-mediated communication. The chapter also considers the implications of these changes for current research in communication studies, with particular reference to the role of context, the link between cognition and interaction, and the use of interlocutory models as paradigms of communicative interaction: communication is not only – or not so much – a transfer of information, but also the activation of a psychosocial relationship, the process by which interlocutors co-construct an area of reality.

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2.1 Introduction

Although Computer Mediated Communication (CMC) is not a novelty, its current spread is casting a blaze of light on the new environments created by electronic communications. The Social Sciences are increasingly interested in understanding the characteristics of CMC and its effects on people, groups and organizations [1]. The first of these effects has been a revolution in the metaphors used to describe communication [2].

That there is already considerable conceptual and metaphorical overlap between the languages of information technology and communication studies is well known. What is new, however, is where the exchange of metaphors is taking place. CMC is no longer, and not only, described using models of man-machine or machine-machine interaction. As recent experiments by Nass and Steuer [3] have shown, the psychological processes typical of CMC "... have more in common with interpersonal interaction than with technological procedures which do not reproduce the person-to-person relationship, as when a computer is used as a calculator, for example" (p. 522).

Perhaps the most important change in psychosocial terms is in the concept of communication: the model of communication as the passage of information from one person to another is becoming obsolete. This model, usually called the "parcel-post model" [4, 5], is now being radically challenged, partly because of some of the peculiar features of electronic environments, such as the asymmetry between message sender and message receiver.

The information-transfer model of communication does not take into account the cooperative component, which stimulates reciprocal responsibility for successful interaction and a series of subtle adaptations among interlocutors. As Dohény-Farina [6] notes: "The theory of communication as information transfer separates knowledge from communication; it treats knowledge as an object that exists independently of the participants in the innovation venture. With this independent existence, information becomes an object that can be carried through channels" (p.8). However, it is possible to communicate only to the extent that participants have some common ground for shared beliefs, recognize reciprocal expectations, and accept rules for interaction which serve as necessary anchors in the development of conversation [7]. Thus, CMC is generating a new, alternative concept of communication as the shared construction of meanings [8, 9].

Another important psychosocial change brought about by CMC lies in the concept of interaction [1, 10]. Until now, the physical co-presence of both interacting subjects has been used to distinguish interaction from relationship, the latter implying inter-subjective communication that can be maintained even at a physical distance. However, even in telephonic communication, which predates digital computer technology, there can be no doubt that interlocutors do interact, even though they cannot see each other. This is even truer of videoconferences, in which the simulacrum of the other person's physical is rendered more convincing by the additional visual channel, and situations in which physical contact is even more rarefied, such as network communication between several computers, or when seemingly 'real' contact is essentially the outcome of high-quality simulation, as in virtual reality [1, 11]. Virtual reality, more than any other technology, carries the detachment of interaction from physical interlocutor co-presence to its logical extreme, and challenges the very concept of interlocutor identity. Clearly, a detailed psychosocial analysis of CMC, and of its more advanced forms like virtual reality, will be extremely useful to anyone who studies, designs or simply uses communication systems of this type.

This paper looks at basic ideas that will help us to construct a general model of interpersonal interaction in CMC. In particular, we shall attempt to define three psychosocial roots of CMC – networked reality, virtual conversation and identity construction – because they

are essential to understanding how the subjectivity of digital interactive communication is constructed.

2.2 Networked reality

“Cognitions emerge [...] from the conversational interactions in which children participate from a very early age [...]. Far from being circumscribed by experimental laboratory settings, cognitive activities are routine daily activities. In other words, it is in everyday life, and in conversational interaction especially, that we put our cognitive skills to practical use” [12, p.117. Our italics]. “The higher mental functions are dialogic processes derived from interpersonal activity. [They] develop through the progressive internalization of semi-otically manifested perspectives on reality [...]. The emergence of these functions in the context of social activity constitutes the cultural line of development. [13, p. 47].

These two quotations illustrate very well the so called “dialogic approach” [13, 14] which seeks to assess how cognition relates to interaction, and to conversational interaction especially. Although methodological problems still have to be solved, cognitive studies are increasingly concerned with defining and exploring the relationship between cognition and interaction. As Perret-Clermont and Brossard [15] and Fernyhough [13] have shown, the essential groundwork for this new approach, in psychological terms at least, is provided by Bakhtin [16, 17], Bartlett [18], Gergen [19], Piaget [20], and of course, Vygotsky [21]. Though they differ in detail on many points, all of them agree that the social system should be seen as a network of relationships providing the space in which cognitions are elaborated. As we hinted in our introduction, this space cannot be understood in physical terms only. That interaction no longer has to depend on the physical co-presence of interlocutors is now taken for granted in the construction of non-physical interactive settings (most typically, virtual reality) characterised by increasingly higher levels of simulation. Moreover, this shift in emphasis has revealed key structural features of interaction which have hitherto been concealed by dogmatic insistence on the physical co-presence of subjects. The co-presence of utterances, rather than the physical co-presence of interlocutors, is now seen as the key to the construction and performance of cognitive functions [22, 23]. In this context, ‘co-presence of utterances’ is typical of the communicative exchange described by Goffman [24], in which two interlocutors are able to influence each other's actions, and regulate the nature of their communication, through some form of feedback. Thus, cognition has a clear social connotation. It is “action, to the extent that those who take part in it have to organise a flow of shared activities by coordinating and concatenating their actions ... [and] communication, to the extent that the interlocutors make themselves mutually accessible, or render explicit the elements that enable them to understand each other and act together” [25, p. 19].

Most researchers, or at least, those who adopt a psychosocial approach to cognition [12, 14], would find little to disagree with here. What is new, however, is that cognitive activities are increasingly being performed in networked contexts which, to varying degrees, are undeniably virtual. The network model is therefore essential to how the matrices of cognitive functions (De Kerckhove's brainframes [26, 27]) are constructed, and to the overall configuration of the knowledge system, which Pierre Lévy's [28] recent concept of collective intelligence describes particularly well. Thus, cognition is now seen as something that happens 'between' rather than 'inside' subjects; as a media-structured loop that begins and ends with the subjects themselves; as a continuous exchange which generates a shared construction of reality at the interface between individual and collective; as cognition and interaction, mental activity and social activity [10, 13, 14, 29]. This concept is also strictly

related to the notions of "team situation awareness" or "shared mental models", that are commonly used in human factors research [30, 31]. The common root is the social approach to cognition: cognition has lost its traditional connotation as a private event, and is now regarded as both a coordinated activity (in terms of process) and a networked reality (in terms of how the products of the process are distributed).

The concepts of brainframe and collective intelligence are especially useful because they enable us to describe this type of cognition in terms of two levels – micro and macro, depending on 'closeness' to subject.

2.2.1 Inter-brainframe

According to De Kerckhove [26, 27], the fundamental stages in man's 'cognitive' development parallel the ways in which communication techniques and technologies have shaped not only interpretations of the human mind and brain function, but also views of society and the world over the ages. Marshall McLuhan, De Kerckhove's teacher, claimed that societies are always in-formed more by the means used to convey information, than by the content of the information itself. Developing on this insight, De Kerckhove has identified three types of brainframe – alphabetic, video and cybernetic – which determine how we perceive the world. The personal computer allows us to respond in a personal way to what we see on the screen (alphabetic brainframe), but the nature of our response is dictated by the rigid, inexorable logic of the program (videoframe). According to De Kerckhove, the unique feature of the cybernetic brainframe is that it enables us to externalize mental awareness; in other words, television has transformed us into image consumers, whereas the computer, by projecting us outside our own nervous systems and giving us access to, and power over, all aspects of the environment (cyberspace) we find ourselves in at any time we choose, has transformed us into information producers. The next step from television-induced mass culture is the culture of speed and 'personalized access'. Networking now enables us to access any sort of information without having to move. By becoming nodes in a network, individuals can analyse the information they have access to with ever greater thoroughness and freedom of manipulation. Developing on De Kerckhove's idea, recent advances in communications suggest that we may now be seeing the emergence of an inter-brainframe, i.e. the brainframe that results from the networking of minds. This implies that technology and human minds are linked by feedback (circular causality and reciprocity), and that this feedback generates the interaction which both structures, and is structured by action. However, the inter-brainframe does not supersede the cybernetic brainframe as just another stage in the 'evolutionary' cognitive process envisaged by De Kerckhove; it is co-present with all the others, and its presence can be revealed by psychological analysis of interaction. The inter-brainframe places the accent on networking, the connecting-up of a multiplicity of cognitive frames which are all simultaneously present and active in communicative interaction. And as we have already seen, interaction provides the setting in which we put our cognitive competencies to practical use.

2.2.2 Collective intelligence

The concept of collective intelligence recently proposed by Pierre Lévy [28] is in some ways the anthropological equivalent of the inter-brainframe. Since it is both a form of 'networked reality' and a 'coordinated activity', collective intelligence is the social complement (in terms of product and process) of the cognitive inter-brainframe concept. Lévy says that "collective intelligence is not a purely cognitive object", where 'intelligence' has the explicit or implied meaning of phrases like "using one's intelligence", "by common accord" or "mu-

tual understanding with the enemy" (p.31). The emphasis is on a plurality of subjects, and the coordination and convergence of the actions they undertake. In this sense, collective intelligence should be seen as "a ubiquitous intelligence which is continually being enhanced and coordinated in real time, an intelligence which mobilizes cognitive competencies". If this is true, we must also look carefully at how the products of this intelligence are handled in the space 'between' minds where knowledge is generated and competencies develop. Naturally, the configuration of such a reality requires the appropriate kind of communication technology. As Lévy himself says, "beyond a given quantitative threshold, the coordination of intelligence in real time performance requires the use of digital information technology" (p.56). Thus, collective intelligence relies on technological systems which enable members of a community to "coordinate their interactions within the same virtual universe of knowledge", as usually happens in cyberspace. To achieve this, a technological system must offer any user comprehensive and easy access to all other users, and the possibility of real-time information processing. Clearly, the network is the medium which best meets these requirements because it transforms collective intelligence into "a ubiquitous coordinated intelligence which is constantly being enhanced, coordinated and mobilized in real time" (pp.34-35). Obviously, the network must be 'intelligent', and it must also facilitate human contact by enabling subjects to recognize each other in and through the network. Facilitating human contact implies exploiting the "diversified range of knowledge and awareness" other people possess, and encouraging new, positive definitions of self by motivating other users, and eliciting in them the sense of gratitude that in turn facilitates the development of socially rather than individually oriented projects [28].

Described in this way, 'networking' may sound more like an anthropological project, or some new kind of social utopia, than a new technological system. The 'prophetic' aspects of Lévy's ideas do not concern us directly here, but clearly, the social impact and, more importantly, the technology design implications of networking will have to be carefully evaluated in terms of the "new mechanisms of thinking and negotiation" (p.18) they entail.

2.3 Virtual conversation

Virtual conversation, the form of conversational interaction assumed when mediated by technology of a more or less virtual nature, is the second of the three psychosocial roots of interpersonal interaction in CMC. To define it adequately, we first need a historical overview of the theoretical and methodological models that have shaped perceptions of the relationship between interaction and communication.

In the introduction, we noted that the redefinition of communication itself is the most important psychosocial change resulting from CMC: the "parcel-post model" of communication as the passage of information from one person to another through channels is becoming obsolete. However, communication is possible only if participants have some common ground for shared beliefs, acknowledge each other's expectations, and accept interactive rules which serve to keep the developing conversation on track [7]. CMC is giving rise to a new, alternative concept of communication as the shared construction of meanings [8, 9].

In this section we shall look closely at how these new models have developed, and assess their influence on how communication is described, and how the subjects involved in it are defined. Changes in the status of language within the communication process will also be discussed. Finally, a survey of more recent studies of human-computer interaction, and the paradigms currently used to describe this interaction, will help us to understand how

CMC, and the new insights it has given us into the relationship between technology and human communication, is influencing perceptions of communication in general.

2.3.1 *Communication models*

The earliest communication models were based on the technical issues influencing signal transmission in telecommunication systems. However, it was soon realized that models based on electromechanical or electronic functioning could offer only a partial explanation of human communication because they were unable to reconcile the isomorphic features of machine-machine or man-machine communication, with other features deriving from the active presence of verbal language in communication. This revision produced the first linguistic models of communication, but they too proved unsatisfactory because communication, though basically a linguistic phenomenon, is also affected by the psychosocial relationships between the subjects involved in it. The more comprehensive psychosocial models of the past decade have recently benefited from more detailed studies of the interlocutory features of communication, which researchers increasingly see as conversational forms of interaction, and this has given rise to a second generation of psychosocial models. In the 'guided tour' which follows, we shall see how the basic features of a more inclusive approach to the study of man-machine(-man) interaction have evolved.

2.3.1.1 *The parcel-post model*

Shannon and Weaver's [4] model of signal transmission in telecommunication systems is still the best known and most widely used. Communication is defined as the transfer of information (message) from a transmitter (source) to a receiver in the form of a signal, which is sometimes modified by disturbance ('noise') in the transmission system itself.

One undeniable advantage of machine-machine communication models is that they provide a general description of communication. However, the fact that purely technical models cannot take account of the specifically linguistic features of verbal language has hindered the development of models which do incorporate the verbal dimension of human communication.

In particular, Shannon and Weaver's concept of analogy, the idea that, in the absence of system noise, the information transmitted is the same as the information received, has proved especially limiting because it reduces all language to a code, and concentrates exclusively on system noise rather than other types of (human) disturbance. It is certainly true that system noise is neither exclusively physical, nor limited to technical features of the system itself, but distortions of a cognitive, linguistic and psychosocial nature, to mention only the most important ones, are now seen as more crucial to our understanding of the pragmatics of communication.

The conclusion must be that, although it has been beneficial as a stimulus to research, Shannon and Weaver's pioneering model is now too approximate and restricting for the purposes of current research into human communication.

2.3.1.2 *Linguistic models*

One of the clearest theoretical rejections of the analogy between verbal communication and physical data transmission has come from Roman Jakobson, whose analytical rather than synthetic model of communication stresses the communicative function of each and every component within the overall process of communication [32]. "The sender sends a message to the receiver. To be operative, the messages needs first of all a context [...] of which the

receiver is aware, and which is both verbal and susceptible to verbalization. Next, the message needs a code which is shared, in whole or in part, by the sender and the receiver [...] Finally, contact is needed between the sender and receiver – a physical channel and a psychological bond which enable them to establish and sustain communication" [32, pp.213-214]. Jakobson links these six physical components of communication (sender, message, receiver, context, code, contact) to six linguistic functions (expressive, connotative, phatic, metalinguistic, denotative-referential, poetic) which establish the intentionality of the communicative act. This may seem to make Shannon and Weaver's model redundant, but Jakobson's description is dependent nonetheless on Shannon and Weaver's rigid alternation of transmitter and receiver, and similarly fails to take account of the influence of social context on how the message is produced. The importance of social context requires further comment if only because Jakobson incorporated it in his model, but never fully explained its precise role. This apparent inconsistency is hardly surprising (researchers have long preferred to regard context as a set of linguistic rather than social components, in keeping with the disciplinary perspective of linguistics itself) but it has certainly impeded awareness of communication as an inter-personal activity. The only researcher actively to oppose the trend was Bakhtin [16, 17] who openly attacked the abstract objectivism of Saussurian linguistics. Convinced that language derives its meaning not from "the abstract system of language forms ... nor even [from] the psycho-physiological act of its performance, but [from] the social event of verbal interaction performed through one or more speech acts" [33, p.172], Bakhtin stressed the fundamental importance of immediate social situation and wider context in determining the actual structuring of utterances from within.

Rather than concentrating on the linguistic functions of communicative exchanges, Marc and Picard's [34, p.26] concept of SPEAKING (Setting-Participants-Ends-Act Sequences-Keys-Instrumentalities-Norms-Genre) proposes "a pragmatic study of the major features of linguistic interaction recontextualized in the social situation to which they are ascribable". Though they do not fully answer the objections raised by Shannon and Weaver, linguistic models, most notably those of Jakobson, have enhanced both the conceptual repertoire available to analysts, and our awareness and understanding of aspects of communication which technical models fail to take into account. However, as Marc and Picard [34, p.29] have pointed out, linguistic descriptions nonetheless have as their object an 'ideal' process which ignores most of the difficulties and accidents that beset communication in the real world. Moreover, these "difficulties and accidents" are largely unrelated to technical or linguistic factors in any narrow or direct sense because they are generated for the most part by interaction itself.

2.3.1.3 Psychosociological models

The most important, and unique, feature of psychosociological models is that they regard communication as a psychosocial as well as linguistic relationship. In one of the more interesting of these models, Anzieu and Martin try to take into account the "mistaken interpretations, paradoxical misunderstandings, flagrant non-senses and obvious conflicts" inherent in human communication [35]. They reject the notion of "a transmitting 'black box' and a receiving 'black box'" in favor of "a 'locutor' and a 'locutee', or, more generally, [the relationship] between two or more people engaged in discussing meanings in a shared situation" [35, p.133]. Essentially, the psychosocial concept is a dual one. On the one hand, communication is seen as the encounter of two or more 'fields of awareness' belonging to subjects who have precise psychosocial identities; on the other, communication is defined as a multi-channel, multi-coded activity. Communication is therefore seen as a global system in which interactors construct meaning by using and interpreting not only words, but also intonation,

gesture, posture, attitude and the space between them (proxemics). Studies by Birdwhistell, Argyle, and the Palo Alto school [36] have stressed the distinction between digital and analogical forms of language, opening the way to the study of aspects of communication hitherto overlooked by orthodox technical and linguistic approaches.

In essence, psychosocial models have made four basic contributions to our understanding of communication. First, psychosocial models have effectively broadened the field of enquiry by defining communication as a 'global', all-embracing phenomenon. By recognizing the importance of the non-verbal and proxemic communication that supplements (integrates) purely verbal communication, they have opened up new perspectives in our understanding of communication. In theoretical terms, this means that every component of behavior has a precise communicative value; in methodological and technical terms, the greater perceived complexity of communication has raised new issues and has generated more interdisciplinary forms of study.

Second, language is no longer seen merely as a vehicle for transferring information from one mind to another, but as "an essential dimension of the culture to which are ascribed most of the social values and representations on which collective exchanges and practices are based" [34, p.35].

Third, the focus is increasingly moving away from the practicalities of information transmission towards the ways in which meanings are processed and shared. Communication is thus becoming crucial to our understanding of how social bonds are forged: the view that communication is essentially a social activity is gaining ground as researchers increasingly reject models which reduce communication to a sender-receiver relationship. When defined as the activation of a "certain form of psychosocial relationship" [37, p. 420], it seems clear that communication is largely determined not by the physical co-presence of interactors, but by the encounter of their respective social identities.

Finally, psychosocial models of communication place great stress on context. As we have seen, it was Hymes who introduced the concept of setting, which includes both the general context of physical features that influence the spatial and temporal performance of the speech act, and the psychological context, or scene, in which it takes place. Psychosocial models make possible orderly descriptions of the linguistic and social features that determine the nature of a communicative setting.

2.3.1.4 Interlocutory models

One of the key features of interlocutory (conversational) models [23] is that they stress the interactive nature of communication. The importance of interlocution in these models is reflected in the efforts of researchers (Charaudeau [38], Ghiglione [8, 29] and Trognon [12, 39] in France; Potter and Wetherell [40] in the USA and Great Britain) to combine pragmatic linguistics with social psychology.

Interlocutory models are based more or less explicitly on the concept of "communicative interactionism", meaning that they stress the importance of interaction and conversation in communication. Major features of the interlocutory approach include a new conceptual definition of communication [41, 42], clarification of the contractual (negotiable) nature of some aspects of communication [8], and a radical revision of the concept of the interlocutor [38]. As an "irreducible relational fact" [42, p.115], communication is seen as both a primary form of human recognition, and the basis of the intersubjectivity through which the reciprocity of all human relationships is expressed.

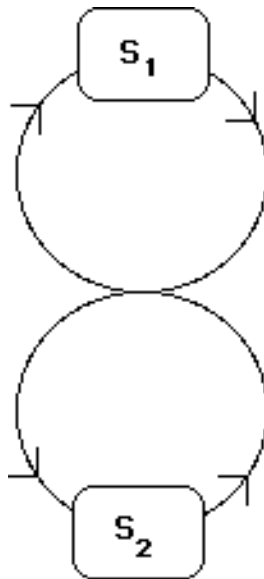


Figure 2.1 The parcel-post model

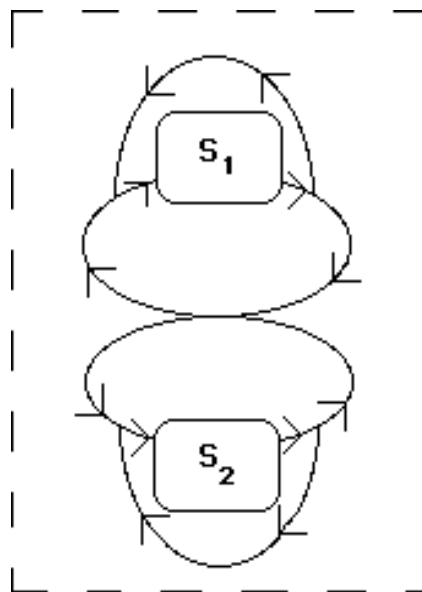


Figure 2.2 Communicative interactionism

Unlike the parcel-post model, the interlocutory approach rejects all “atomistic” interpretations which invariably see communication as an aggregation of discrete elements. In the atomistic approaches epitomized by the parcel-post model (see Fig. 2.1), an interaction is defined as an action (or reaction) which passes from one human being (S_1) to another (S_2); as a form of feedback which each subject exerts on the verbal acts of the other by mediating the images they convey.

In "communicative interaction", however, the circuit is rendered more complex by a further set of elements. As Fig. 2.2 shows, the circuit linking the two interlocutors is subordinated to a system of a higher order than the S_1 - S_2 couple (which tends to maintain its own autonomous features and organization).

The message which S_1 sends to S_2 is simultaneously regarded as a message which S_1 sends to him/herself – ‘I say to myself what I say to you’ – so that the words uttered by both interlocutors are directed both to themselves and to the other interlocutor in a 'double listening' process. Signifying and understanding are no longer independent actions: there can be no signification without understanding. S_1 has to know how S_2 has received the message in order to know what the 'real' message is (i.e. the message received is different to, and belongs to different order from, the message which S_1 rehearsed with him/herself). So the process by which both messages are understood forms a sort of feedback loop. Similarly, each subject receives back from the other (at least in part, according to Jacques) what he or she has succeeded in transmitting – 'what you understand is what I have succeeded in signifying' – so the message may be regarded as a joint S_1 - S_2 initiative.

The diagram of communication in Fig. 2.2 also reveals the existence of a communicative spiral. At every stage in the evolution, the system can never fully match 'what I wanted to say' with 'what you have understood'. The message transmitted by S_1 is a form of 'system disturbance' which S_2 must compensate for if the stability of the system is to be restored. However, this compensation can only be partial because S_1 must react in the same way to the return transmission from S_2 . Thus, the system evolves in step with interaction between S_1 and S_2 while also keeping a 'window' open to the outside world in order to receive the 'information' on which it feeds.

This is, therefore, an interactive communication system in which S_1 and S_2 alike are subordinated to the “self-organized functioning” [42] of the dyad formed when they relate to each other as a couple. S_1 and S_2 subordinate themselves to the functioning of the system, which constitutes their shared interlocutory space ("logical space of interlocution"; [41]). To reduce the communicative lag between S_1 and S_2 without overstepping the limits which the system needs to preserve its partial closure to information from the outside world, the two interlocutors activate a “discourse strategy”, i.e., a set of coordinated communicative interactions which construct the communicative setting in progressive stages.

Awareness of the contractual nature of communication, the notion that something is at stake when people communicate with each other, illuminates several features of the 'game of reciprocity', and enables us to describe communication as a coordinated attempt to construct possible worlds. As Ghiglione says [8], "communication is the co-construction of a reality using a system of signs and a mutually acceptable set of principles which make exchange possible and provide the rules needed to govern it" (p.102).

Since conversational models define communication as a contractual process jointly negotiated by interlocutors, the concept of the interlocutor also has to be redefined. Each communicative event is seen as a dialectical encounter between two processes: one expressive, in which a communicating 'I' addresses a receiving/uttering 'You'; the other interpretative, in which an interpreting 'You' in turn construes the image of an uttering 'I'. The two processes intertwine in a subtle interplay of mutual recognition and acknowledgement between the interlocutors involved.

2.3.2 *Conversation in CMC: virtual conversation*

Turning now to studies of CMC, the first important point to note is that two distinct types of CMC (synchronous and asynchronous) can be identified [43].

Synchronous CMC is produced when communication occurs simultaneously between two or more users, as in any normal telephonic or face-to-face conversation. Asynchronous CMC is produced when communication is not simultaneous. The essential difference between the two is a temporal one, therefore: for CMC to be synchronous, computers must be linked in real time.

The commonest form of asynchronous CMC is E-mail, in which a sender leaves a message in a receiver's electronic letterbox, which the receiver must open before he can read the message. Another more sophisticated type of asynchronous CMC is Newsgroup, an electronic notice-board on which users can post messages referring to a specific topic or area of interest. Users can read the messages by opening the notice-board, and send their own messages in turn. As with E-mail, there is no real-time link between the computers of the interacting subjects.

Despite the predominance of the textual mode, it has been shown that asynchronous CMC differs in psychosocial terms from non-electronic written communication, as well as from other existing means of communication. Experimental studies designed to compare CMC and non-electronic written communication [44, 45] have revealed significant differences in their respective degrees of social presence and media richness. Social presence is the user's perception of the ability of the means of communication to marshal and focus the presence of communicating subjects [46], while media richness is the ability of the means of communication to interlink a variety of topics, render them less ambiguous, and enable users to learn about them within a given time-span [47]. Studies by Rice [45, 48] have shown that there is significant variation in user perceptions of the degree of social presence/media richness in E-mail and video-conference, compared with other means of communication like the telephone and written text.

Unlike asynchronous CMC, the most important feature of synchronous CMC is that it does provide a real-time link between users' computers. Although the most frequently cited example is the video-conference, the most widespread system is in fact Internet Relay Chat, or IRC. IRC is a form of synchronous CMC which enables a group of users (a chat) to exchange written messages and interact with each other in two different ways, by sending a message either to a specified user, or to all members of the chat. One IRC variant of particular interest to communication researchers is MUD (also MOO, MUSH and VEE), "software which accepts the multi-user link through a certain type of network ... and gives each user access to a shared databank of rooms, exits and other objects. Each user consults and manipulates the databank from inside one of the rooms, see only the objects in that room, and moves to other rooms mostly by using the exits that link them" [49, p. 229]. In practical terms, MUDs may be regarded as a form of network-accessible, multi-participant, user-extensible virtual reality whose interface is entirely textual. This approach enables users not only to speak to each other (as in IRC) but also to explore the space they find themselves in, and to interact with the objects in it [50]. Another feature of MUDs is that they enable users to interact in more complex ways than are possible with IRC. As well as sending written messages, MUD participants can use metacommands to describe their emotions and perform complex actions like striking another user or giving him objects [50, 51]. One fairly recent form of synchronous CMC is the Internet Phone, an IRC mode that replaces written text with voice messages. Internet Phone is broadly similar to telephonic communication, with the important difference that, as in transceiver communication, only one user can speak at a time.

Synchronous CMC also has special features which distinguish it from other forms of communication. According to Newhagen [52] these include (especially in synchronous CMC via Internet) multimodality, hypertextuality, packet switching, synchronicity and interactivity.

There is a technical reason for these differences between synchronous and asynchronous CMC. Communication with a keyboard and computer screen takes longer than normal face-to-face communication, and the absence of metacommunicative features like facial expression, posture and tone of voice encourages users to find other ways of making communication as complete as possible.

These limitations make CMC interaction more rarefied than the kind of interaction that happens in normal conversation, in the sense that CMC uses mainly textual devices (abbreviations and smiles [43] as well as MUD metacommands) to reproduce the metacommunicative features (emotions, illocutionary force) of face-to-face conversation.

The most common abbreviations (in English) are CUL8R (See you later), HowRU (How are you?), 2B (To be), IMHO (In my humble opinion); WRT (With respect to), and many of them are used to add an emotional dimension on the literal meaning of messages. For example, IMHO adds humorous overtones to a sentence. Smiles, graphic symbols depicting a stylized smiling face, are also much used. The most popular are :-) to convey positive emotion, :-(to convey negative emotion, and :-o to convey surprise.

However, the differences between CMC and face-to-face conversation are important. While face-to-face conversation occurs in a cooperative environment constantly regulated by mutual adjustment and correction [22, 53], CMC occurs in a much less cooperative environment because of the special conditions imposed by the medium itself [54]. In most CMC environments, and in asynchronous CMC environments especially, two typical features of face-to-face conversation are missing [55]:

- the collaborative commitment of participants and the co-formulation of the message;
- the feedback which allows the social meaning of the message to be processed immediately.

In addition, CMC in no way guarantees that a user's declared identity is the real one. The use of false identities, often of a different sex, is widespread in electronic communities and in MUDs especially [11, 49-51].

In this sense, CMC may be regarded as an example of virtual conversation, i.e., a necessarily "pared-down" or, perhaps, more accurately, rarefied form of conversation [10] which lacks the rules on which effective interaction depends. Computer mediation creates an asymmetrical imbalance in the sender-receiver relationship: the sender can transmit information and get cooperation under way, but has no guarantee that the receiver receives the transmission, while the receiver has no guarantee that the sender's declared identity is the real one.

Ghiglione's definition [8] of communication as the co-construction of a reality using systems of signs and rules, applies equally well to CMC as an instance of virtual conversation, with the important difference that in CMC a reality is asymmetrically co-constructed because the receiver can decide at will to terminate interaction, or continue it by turning himself into a sender. This decision is far from casual: it depends on how the receiver interprets the situation, what his aims are, and the social rules that govern his behavior. Some researchers have even used the term "electronic opportunism" to describe this feature of CMC [56]. In this sense, CMC may be defined as a process by which a group of social actors in a given situation negotiates the meaning of the various situations which arise between them [57].

2.4 Identity construction

Stasser's definition of CMC may seem straightforward enough, but it has two important implications which have had a decisive effect on CMC studies [1].

If CMC is a process of negotiation:

- the only way to understand it is by analyzing the subjects involved in it, and in the environment in which they operate, meaning that the social context in which CMC occurs plays a crucial role;

- new processes and activities will develop which challenge and modify the initial relationship between subject and context.

Most researchers would broadly agree that these two statements are true. According to Mantovani [55], the early 1990s saw changes in the study paradigms of person-computer and person-computer-person interaction. The main outcome of this has been the understanding that interaction can only be fully understood through detailed analysis of the social context in which it occurs: "... at this point we should no longer see people simply as 'users' of given systems, but as social 'actors'. In other words, whether expert computer users or not, people act independently and have their own reasons for what they do, and it is computers and systems that have to adapt to people, not vice versa" [55, p.63].

But although researchers now take for granted the need to analyze context, there is rather less agreement over what form the analysis should take. In this paragraph we shall explore the similarities and differences between the various approaches that have been adopted.

2.4.1 The early phase of CMC: the theory of Social Presence

The concept of Social Presence emerged in the mid 1970s from studies by Short and colleagues undertaken to find ways of cutting communication costs in British government offices by assessing the relative merits and disadvantages of various communication systems. One important result was their concept of social presence; another was the understanding that CMC is extremely low on social presence because it lacks the non-verbal features of face-to-face communication [46].

Ten years later, the American sociologists Sproull and Kiesler carried this idea a stage further by stating that CMC lacks the specifically relational features (social cues) which enable interactors to identify correctly the kind of interpersonal situations they find themselves in [58].

Sproull and Kiesler concluded from this that CMC occurs in a social vacuum where the personal identities of subjects tend to fade and vanish [59]. The most important consequences of this are that:

- CMC subjects tend to express themselves more openly and freely: "People who interact via computer are isolated from social rules and feel less subject to criticism and control. This sense of privacy makes them feel less inhibited in their relations with others" [59, p. 48].
- at the same time, however, loss of personal identity may encourage subjects to break social rules. Siegel, Dubrovsky, Kiesler and McGuire [30] cite flaming, the trenchant and sometimes insulting verbal style they regard as typical of CMC, as evidence of this.

According to Sproull and Kiesler [59], the effects of CMC are not only seen in individual subjects; they also have a powerful impact on organizations, which tend to become more democratic because of the 'equalization' effect which makes information more readily available and gives subjects a bigger say in decisions [60].

In confirmation of this, they cite the results of experiments conducted with students and recent graduates [59, 60]. One initial study revealed that, in network conferencing, participants of higher status gave those of lower status more room to express their views than would have been the case in face-to-face discussions. Moreover, unlike in face-to-face discussions, where the opening comments that will orient subsequent discussion are made by

participants of higher status, those in CMC groups are more equally distributed among the participants.

However, Sproull and Kiesler's conclusions, and even their experimental results, have come in for a lot of criticism. For example, Adrianson and Hjelmquist [61] have used the results of experiments at the Swedish Institute of National Defence Research to disprove the equalizing effect of CFC discussion. Similar criticisms have been made by Austin, Liker and McLeod [62], Klein and Kraft [63], and Spears and Lea [64].

The existence of flaming in CMC has also been challenged. According to Lea, O'Shea, Fung and Spears [65], flaming is not unique to CMC and is in any case rather rare, while Weedman [31] regards flaming as a typical product of American university education and culture.

However, most criticism has been directed at the alleged absence of social cues in CMC. Mantovani [55] asserts that Sproull and Kiesler's claim that CMC occurs in a social vacuum "[is] unacceptable in general terms because it reduces social reality to some form of physical connection between individuals ... To be excluded from the social context isn't simply a matter of being alone in a room" (pp.170-172).

Mantovani's criticisms are backed up by numerous studies of social identity and self-categorization, which show that the relationship between an individual and the social context and reference group is conceptualized in socio-cognitive rather than structural and relational terms [64, 66-69]. These studies have shown that subjects are characterized not by one fixed self, but by a variety of selves (self-categories), including the personal and social identities which emerge from the contexts in which they are rooted [69]. Since they play a crucial role in the creation of context, social categorization and individuation are a major influence on subjects' behavior, irrespective of the co-presence of other people.

It is precisely the absence of non-verbal feedback in CMC which makes these processes even more important than in face-to-face communication. According to Lea and Spears [44], "it could be claimed that the absence of social rules coming from other people, and the uncertain situation which results from this, force people to use social reference norms to regulate their own behavior" (p. 286).

2.4.2 *Organizational models: Network Paradigm and Adaptive Structuration Theory*

These considerations have shifted the focus of study to what happens inside CMC. Analysis of social presence centered on the communicative process itself, while subsequent studies looked instead at the context, and especially the organizational structures, in which CMC occurs.

One of the first outcomes of these studies was that they bore out the criticisms leveled against Sproull and Kiesler. Not only does CMC not produce any equalization effect inside organizations; it also tends to maintain or even strengthen both status demarcation and existing patterns of interaction [70, 71]. It should also be noted that, given the unlikelihood of most members of an organization ever having access to new technology, CMC may well generate still further inequality or become a weapon in the struggle for power [72, 73]. So in predicting the impact of CMC it is important to know which type of organization we are dealing with. This awareness has resulted in two different approaches to CMC analysis: the Network Paradigm, and Adaptive Structuration Theory whose principal aim is to analyze the relationship between CMC and the organization.

The first to be developed was the Network Paradigm, which sought to "draw [attention] away from individuals as independent senders and receivers of messages towards individuals as actors operating within a network" [73, p. 629]. The Paradigm's principal aim is to develop a model which can account for the behaviors of subjects (users, groups, organiza-

tions) in terms of relational structuring. Relationships are expressed in a matrix of N^2 elements in which N is the number of subjects involved. Each matrix element expresses the intensity (presence, strength, frequency of communication) of the bond between two different subjects. Though this approach does undeniably have the merit of describing the totality of the relationships between actors in a simple and immediate way, it too has come in for its share of criticism. Both Lea [44] and Mantovani [55] have pointed out that the Network Paradigm shows undue interest in the economic changes brought about by CMC, at the expense of the individual and social aspects of communication. It certainly is true that many Network Paradigm studies (those of Caswell [74], and Malone and Rockart [75], for example) do concentrate on economic considerations like productivity and cost reduction, and overlook the social impact of CMC. Mantovani [55] identifies the other limitation of the Network Paradigm as its powerful underlying determinism, the notion that there is a one-way causal relationship between new technology and social context. In reality, change carries over from organizations to technology, as well as from technology to organizations.

Adaptive Structuration Theory, or AST [76, 77], has its roots in Giddens's theory of structuration [78], the sociotechnical theories developed by researchers at the Tavistock Institute in London [79] and structural contingency theory [80].

Essentially, AST assumes that groups cohere around social routines closely linked both to the task in hand, and to the context in which they are located [76, 78], meaning that the impact of technology on groups can be assessed by analyzing how they tend to structure themselves [77]. As Contractor and Seibold [81] point out, "the uses and impact of technology first become apparent in the complex social interactions between users" (p. 529). Analysis of this type has revealed close links between technology and organization. By fostering new social routines, technology does have an impact, however partial, on organizational features. But at the same time, the perception and acceptance of these routines depends on the context into which the new technology is inserted. The result is a form of reciprocal influence which varies according to the situation in which it occurs.

Researchers have thus been set a double task. First and foremost, the situation calls for careful longitudinal study of technology-related social routines in the groups and organizations in which they occur. But it also calls for careful analysis of the relationship between objectives, technology and actors in order to explain why similar groups, though working to achieve the same objectives, perceive and use technology in different ways.

2.4.3 Psychosocial models: Situated Action Theory and Positioning Theory

AST too has not escaped criticism. Contractor and Seibold [81] identify two principal defects of the theory. The first is that it applies only in situations where technology has already influenced social routines; the second, which would seem to be a defect of both the Network Paradigm and AST, is that it provides only an incomplete explanation of the mechanisms that produce any given situation. By concentrating on economic and organizational features, neither Network Paradigm nor AST successfully translate microlevel analysis into macrolevel analysis, which is why psychosocial models of CMC have been developed to provide a more inclusive explanation of the role played by context.

Situated Action Theory (SAT) developed within the field of socio-cognitive research known as "cognition in practice". Though based on traditional cognitivist analyses of information processing and symbolization, SAT introduces a change of perspective in that it sees action not as the execution of a ready-conceived plan, but as adaptation to context [82]. As Suchman notes, "instead of separating action from the circumstances in which it occurs as the execution of a carefully thought out plan ... [SAT] tries to study how people use circumstances to develop an intelligent course of action" (p.167).

This necessitates profound changes in how "social context" has previously been defined. In SAT, social context is not something physical and stable like an organization or the power structure within it. As Mantovani [55] stresses, contexts are not given, but made.

Thus:

- context is conceptual as well as physical: actors perceive situations using cultural models, and act accordingly in cultural ways;
- context is unstable: cultural models are constantly modified by subjects' actions and choices.

In this sense, social context may be regarded as the symbolic system of a given culture which is continually being altered by practical human intervention.

Applying SAT to CMC, Mantovani [55, 83] concludes that CMC participants cannot be regarded simply as technology users. Rather, they are social actors with their own aims and autonomy in situations, and it is technology which must adapt to them.

This idea poses serious problems, however. If social actors actively respond to their environment and end up changing it, how can context ever be analysed properly? Mantovani meets the difficulty with a three-level model of social context which links situation and social norms to the use of computer technology. The first level is social context in general, the second, ordinary situations of everyday life, and the third, local interaction with the environment via computers.

The links between the three levels can be studied in either direction, starting from use of computers or from social context. Thus, the use of computers may be regarded as part of everyday life, which is in turn part of the broader social context. By interacting with each other, the physical environment and the social context, subjects activate a spiral of actor-environment exchanges. First-level person-computer interaction leads to interaction in everyday situations, and thence to cultural changes.

Working in the opposite direction, social context supplies the elements needed to interpret situations correctly, and situations generate the aims, which determine local interaction with the environment via computer.

So, as we have seen, social context may be defined as the symbolic system of a given culture which is continually being altered by practical human intervention; it cannot be explained exclusively in terms of the interpersonal relationships, or physical environment, in which information exchanges take place. Social context is a prerequisite of communication, "a shared symbolic order in which action becomes meaningful, and so generates meaning" [55, p.106].

Thus, SAT implies a radical redefinition of the meaning of communication. Context may be co-constructed by social actors, but they use communication to exchange meanings, not pieces of information. More precisely, the content of communication is interpretations of the situations which actors are involved in. In this sense, the most effective way of clarifying the meaning of messages is to relate them to a shared context of meaning.

Studies of Positioning Theory (PT) have served to reinforce this view. As recently formulated by Rom Harré [84, 85], PT replaces the traditional concept of role with the concept of positioning. The main difference between the two is that a role is a stable and clearly defined category, while positioning is a dynamic process generated by communication.

Developing on Bakhtin's ideas and Vygotsky's studies, PT identifies two distinct processes underlying social activities. The first, naturally enough, is discourse-generated positioning, which Harré defines as "the way in which subjects dynamically generate and explain their own and other people's behavior" [85, p.405].

Harré defines the second process as the rhetorical redescription by which subjects shape their social context, "the discursive production of stories about institutions and macro-social events undertaken to make them intelligible in the form of social icons" [85, p.394].

As in SAT, context is not given in PT, but is constructed socially in ways which are endlessly different because of the changes communication brings about in the structuring of the cultural context. The main difference between SAT and PT lies in the role attributed to discourse production. PT sees conversation as the most important human activity of all because it encompasses virtually all known mental phenomena. As Harré & Van Langenhove [85] state, "many mental phenomena like attitudes and emotions are immanently present in discourse production" (pp.394-395).

2.4.4 *From context to identity*

Positioning Theory adds new ideas about the relationship between mental and communicative processes to its analysis of context. As we have seen, there is indeed a link between mental and communicative processes, which leads to the formation of specific mental structures called brainframes. However, PT is mainly concerned with the relationship between communication, social context, self, and identity.

The notion that discourse and conversation are closely linked to both mental processes (including attitudes and emotions) and social context is typical of Russian thought. One example is Vygotsky's analysis of the link between mental processes and social context in adult-child conversation [21]. As is well known, Vygotsky believed that this culture-specific form of conversation is internalized by the child to become a part of his mental processes: "Each function in the child's cultural development appears twice: first between people (interpsychology) and then within the child (intrapsychology)" [21, p. 57]. In reality, external language and interior dialogue are intimately related, and the link plays a crucial role in the formation of the subject's identity and higher mental processes [13, 14]. The way interaction with other subjects mediates meaning is fundamental to this shift from external language to interior dialogue. In conversation, the subject not only acts as a goal-directed individual/self, but also actively collaborates in the positioning process.

As Davies and Harré [86] point out, during conversation subjects' selves "participate in an observable and subjectively coherent way in the joint production of story lines" (p. 48). In this phase, which uses interlocution in the manner described by Jacques [41], subjects see themselves as "contradictors" [86, p. 47] and use the positioning process to construct "a variety of selves" (p. 47) closely linked to the outcome of interaction.

This is very similar to the "transactional contextualism" developed by anthropologists and sociologists. For example, Rosaldo [87] says that the notion of self develops not from some internal essence relatively unaffected by the social world, but from experience accumulated in the world of meanings, images and social relationships in which each person is unavoidably involved. Hsu [88] defines this unbroken link between self and environment as "psychosocial homeostasis", the unremitting effort to establish a balance between satisfaction of intrinsic needs and the demands of socio-cultural context.

In psychology, these ideas have carried over into the work of Gergen [19] and Bruner [89]. Gergen in particular has looked in detail at the construction of self, in studies of how an individual's self-esteem and concept of self vary in a set of different situations. These studies show that the concept of self varies both in relation to the kind of people the subject spends time with, and in response to the positive and negative comments they make. On the whole, then, the self may be seen as a product of the situation in which the subject acts. For his part, Bruner, though accepting the subject's autonomy, speaks of "creatures of history"

whose selves are both "a guarantee of stability and a barometer reflecting changes in the cultural climate" (p.108).

How is CMC situated in this intimate relationship between external language and interior dialogue, which finds its most obvious expression in the co-construction processes typical of positioning? We have already seen that CMC may be regarded as a form of virtual conversation, i.e., rarefied, 'pared-down' conversation lacking the rules which alone can ensure that effective interaction takes place, and that computer mediation creates an asymmetrical relationship between sender and receiver which:

- enables the sender to send information and initiate cooperation, but does not guarantee that the receiver receives the message;
- offers the receiver no guarantee that the sender's declared identity is the real one.

That this dual effect is a powerful influence on positioning and the construction of self is more than evident in virtual reality communication. We will now look at some of the features of virtual reality, and attempt to define it in human rather than technological terms. As Steuer makes clear, the concepts of presence and telepresence are essential components of this definition: "presence ... [is] the experience of one's physical environment; the term refers not to the subject's immediate surroundings as they exist in the physical world, but to the perception of these surroundings as mediated by both automatic and consciously-controlled mental processes [...] presence is defined as awareness of being in an environment ... when perception is mediated by communication technology, the subject is forced to perceive two distinct environments simultaneously: the physical environment in which he is present *de facto*, and the environment as presented through the technological medium. The term telepresence is used to describe the precedence which the second type of environmental awareness has over the first ... Telepresence is defined as the CMC-mediated experience of being in an environment" [90, pp.75-76]. These terms enable us to speak of virtual reality without also having to refer to (for example) hardware. Virtual reality may thus be defined as "a real or simulated environment in which a perceiver ... experiences telepresence ... Telepresence focuses attention on the relationship between an individual who is both a sender and a receiver, and the mediated environment with which he interacts" (p.78). These quotations well illustrate the extent of the overlap between the thought processes of virtual reality builders, and the basic principles of communicative interactionism. 'Virtual reality-space' is construed as an electronic analogue of the interlocutory space in which subjects interact to give three-dimensional consistency to the interlocutory space Jacques speaks of (see Fig. 2.2).

However, the virtual environment itself becomes a kind of interlocutor because it adds to the positioning process objects and meanings which are alien to the interacting subjects. The concept of Cyberspace clearly shows that virtual reality is, in fact, a parallel universe created and maintained by the networks in which subjects interact.

The second difference between interlocutory space and virtual reality is that there is no guarantee that the declared identities of the interactors are the real ones. As Mantovani notes, "Virtual reality is a communication environment in which the interlocutor is increasingly convincing in terms of physical appearance, yet increasingly less tangible and plausible in terms of personal identity. This paradox occurs because the physical presence of the other person is convincingly simulated, while the interlocutor's true face disappears behind a mask of false identities" [55, p.197].

It is certainly no accident that members of electronic communities very often adopt false 'nickname' identities, and openly accept them in others. Within the same community, a person may construct and project mask-like identities which function as delegated puppet-agents" [91, p. 105].

Gender switches are also commonly made, often for rather specific reasons: to get to know people of the opposite sex with a view to meeting them; to explore the emotions of people of the opposite sex; although the fun of simply 'dressing up' and pretending to be someone else is also a factor.

But there is a problem here: how can you communicate and activate the positioning process without staking your own identity on the outcome? As we have seen, communication always requires a framework of rules and meanings, and this is especially true of CMC in which many features of face-to-face conversation are 'rarefied'. One solution is to represent yourself by "coding cultural expectations at a symbolic level" [91, p. 102]. In constructing a false identity, the subject has to make wider use of social stereotypes than would be the case in normal conversation if he wishes his identity to be recognized and accepted. This means that CMC, and virtual reality in particular, may force subjects to resort to massive use of stereotypical attitudes and behaviors if they are to achieve any shared understanding of actions and situations [11].

At the same time, however, there may be changes in how personal identity develops. Markus and Nurius' concept of possible selves [92] offers some understanding of these changes, as well as a theoretical explanation of the relationship between identity and context.

According to Markus and Nurius, possible selves "give a specific cognitive form to our desires for control, power and belonging, and our widespread fears of failure and incompetence" [92, p.960].

Although possible selves constitute our repertoire of different selves, their main feature is that they are exempt from direct social control and social negotiation. As Markus and Nurius say, "individuals have ideas about themselves which are not firmly anchored in social reality. As representatives of the self at some future time, possible selves are visions of the self which have not been tested and validated by social experience" [92, p.955].

Potentially, a subject may be in a position to create an infinite number of possible selves, but in normal circumstances the repertoire of possible selves is a combination of the subject's personal experience, and the living and communication environments he is familiar with. As well as being a source of more or less appropriate behavioral models, the media also offer a range of images and symbols that people can identify with easily. Under normal circumstances, subjects can control media symbols and models, but this is much more difficult in a virtual environment. Interactivity and telepresence also endow virtual environments with a degree of conviction and suggestiveness that is increasingly immune to the balancing effects of direct experience and "traditional" social contexts.

As Meyrowitz [93] points out, communication technology has changed our social context. Especially in younger people, the influence of social context on the construction of identity is beginning to wane as reference communities like the family, school or church, which in the past anchored social contexts in shared sets of rules, gradually loosen their grip.

The present situation would seem to be that the new media are accelerating the dissolution of traditional rule-based social contexts, and that this dissolution is itself draining the media of content and meaning. Doheny-Farina [94] argues that once we begin to divorce ourselves from geographic space and start investing ourselves in virtual communities, we further the dissolution of our real communities.

As a result, the media, and the new media in particular, are becoming increasingly remote from everyday reality, a kind of world apart which tends to impose sameness on personal identity and experience. Gergen [95] calls this collective state of extended, permeated selfhood a society of "saturated selves." Alone and isolated, saturated selves experience the world of work and leisure as a space constructed of cultural products and social fictions

[96]. Persons at work occupy constructed space in their networked relations with others. Like a building, the network creates the structure, and like the occupants of that building, workers occupy intellectual spaces.

Probably one of the most convincing descriptions of what this world could be like is given by Mitchell in his *City of Bits* [97]: "a worldwide, electronically mediated environment in which networks are everywhere, and most of the artifacts that function with it (at every scale, from nano to global) have intelligence and telecommunications capabilities... Commercial, entertainment, educational, and health care organization will use these new delivery systems as virtual places to cooperate, and compete on a global scale" (pp. 167-168).

2.5 Conclusions

Defining the three psychosocial roots of the process by which the subjectivity of digital interactive communication is constructed – networked reality, virtual conversation and identity construction – has enabled us to identify three almost parallel tracks in communication studies.

The first leads from intersubjective interpretation of cognitive processes to the notion that cognition is a coordinated activity whose products are situated not in the mind, but in the space between minds. The second leads from communication as a linear process to the use of interlocutory models as paradigms of communicative interaction. The third leads from the essential passivity of communication technology users to active participation in the functioning of a machine which also influences user individuation.

As we have seen, each track important methodological and technical implications for the study of interactive communication via computers, and has resulted in new ways of describing the virtual space inhabited by network users (Cyberspace). This virtual space is now seen as an electronic analogue of the interlocutor space in which subjects interact, a space which paradoxically juxtaposes a convincing simulation of the physical presence of the other, with the disappearance of the interlocutor's face behind a mask of false identities. The key feature of Cyberspace is the interaction through which a new sense of self and control can be constructed. The result of these new senses of self is a new sense of presence that fills the space with fluid forms of network/community. The basis of the community of people interacting in a technological environment is shifting from culture-defining mass media to a proliferation of media as alternative sources of mediated experience.

Finally, these developments have shown that we must now look carefully not only at the social impact but also, and more importantly, at the technology design implications of what actually happens in networked interaction in more or less virtual communicative environments.

Our survey of the shift from the parcel-post model of communication to interlocutory models has revealed profound changes in how the relationship between interaction and communication is defined. Communication was once seen as a process that can be switched on and off at will, an alternation of action and reaction, a series of actions performed in an intersubjective vacuum. Now it is seen as the outcome of a complex coordinated activity, an event which generates conversational space within the weave of personal and social relationships. Thus, communication is not only, or not so much, a transfer of information, but also the activation of a psychosocial relationship, the process by which interlocutors co-construct an area of reality. This happens inside a rather special kind of container (Cyberspace) which tends to rarefy the structural and process features of communication.

On the one hand, the psychosocial dimension of interlocutor individuation has become increasingly important. 'Sender' and 'receiver' – both of which are abstract, monofunctional entities – have been replaced by interlocutors endowed with thoughts, emotions, affects, and a psychosocial identity which expresses their positioning within families, groups, organizations and institutions. As we have seen, this shift in emphasis has influenced the development of research models, concepts of communicative interaction, and CMC itself.

In parallel with this, however, we have noted the increasing dematerialization of interlocutors, or rather, the increasing irrelevance of their physical presence. Thus, the increasing irrelevance of the face-to-face interactive mode has enabled communication researchers to mediate/represent the subjectivity of interlocutors using simulacra of various kinds. The anthropomorphism of the machines they have devised ranges from the telephone (minimum) to virtual reality (maximum), but this has never obscured the (psychosocial) subjective presence of the interlocutors who use them.

Obviously, the issues raised in this paper constitute just the first essential step towards a definitive study of CMC (in which advances are sometimes uneven and out of step) and the culture that has grown up around it. But it has served to demonstrate that communication technologies are no longer seen by researchers as rigid prostheses, external tools marking the limits and limitations of users who are slaves rather than masters, but as transparent interfaces, ways of genuinely enhancing the communication of the interlocutors who use them, whether singly or in networks

2.6 Acknowledgements

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2.7 References

- [1] G. Riva and C. Galimberti, The psychology of cyberspace: a socio-cognitive framework to computer mediated communication, *New Ideas in Psychology* **15** (1997) 141-158.
- [2] D. Schuler, Community networks: building a new participatory medium, *Communication of the ACM* **37** (1994) 38-51.
- [3] C. Nass and J. Steuer, Voices, boxes, and sources of messages: Computers and social actors, *Human Communication Research* **19** (1993) 504-527.
- [4] C. E. Shannon and W. Weaver, *The mathematical theory of communication*. Urbana: University of Illinois Press, 1949.
- [5] D. G. Tatar, G. Foster, and D. G. Bobrow, Design for conversation: Lessons from Cognoter, *International Journal of Man-Machine Studies* **34** (1991) 185-209.
- [6] S. Dohény-Farina, *Rhetoric, innovation, technology: case studies of technical communication in technology transfers*. Cambridge, MA: MIT Press, 1991.
- [7] H. H. Clark and E. F. Schaefer, Contributing to discourse, *Cognitive Science* **13** (1989) 259-294.
- [8] R. Ghiglione, *L'homme communicant*. Paris: A. Colin, 1986.
- [9] R. E. Kraut and L. A. Streeter, Coordination in software development, *Communication of the ACM* **38** (1995) 69-81.
- [10] G. Riva and C. Galimberti, Interbrain frame: interaction and cognition in computer-mediated communication, *CyberPsychology & Behavior* **1** (1998) 295-310.
- [11] G. Mantovani, Virtual reality as a communication environment: Consensual hallucination, fiction, and possible selves, *Human Relations* **48** (1995) 669-683.
- [12] A. Trognon, Psicologia cognitiva e analisi delle conversazioni [Cognitive psychology and conversation analysis], in *La conversazione. Prospettive sull'interazione psicosociale [Conversation: per-*

- spectives in psycho-social interaction], C. Galimberti, Ed. Milan: Guerini e Associati, 1992, pp. 110-122.
- [13] C. Fernyhough, The dialogic mind: A dialogic approach to the higher mental functions, *New Ideas in Psychology* **14** (1996) 47-62.
- [14] A. Saito, Social origins of cognition: Bartlett, evolutionary perspective and embodied mind approach, *Journal of the Theory of Social Behaviour* **26** (1996) 399-422.
- [15] A. N. Perret-Clermont and A. Brossard, L'intrication des processus cognitifs et sociaux dans les interactions [The network of cognitive and social processes during interaction], in *Relations interpersonnelles et développement des savoirs [Interpersonal relationships and knowledge development]*, I. R. Hinde, A. N. Perret-Clermont, and J. Stevenson-Hinde, Eds. Berne: Delval, 1981, pp. 131-145.
- [16] M. M. Bakhtin, Discover in the novel, in *Dialogic Imagination: Four Essays by M.M. Bakhtin*, M. Holquist, Ed. Austin, TX: University of Texas Press, 1981, pp. 259-422.
- [17] M. M. Bakhtin, *Speech genres and other late essays*. Austin, TX: University of Texas Press, 1986.
- [18] F. C. Bartlett, *Remembering: A study in experimental and social psychology*. Cambridge, MA: Cambridge University Press, 1932.
- [19] K. J. Gergen, *Toward transformation in social knowledge*. New York: Springer, 1982.
- [20] J. Piaget, *Sociological Studies*. London: Routledge, 1995.
- [21] L. S. Vygotsky, *Mind in society: The development of higher psychological processes*, vol. Harvard University Press: Cambridge, MA, 1978.
- [22] C. Galimberti, *La conversazione [Conversation]*. Milan: Guerini e Associati, 1992.
- [23] C. Galimberti, Dalla comunicazione alla conversazione [From communication to conversation], *Ricerche di Psicologia* **18** (1994) 113-152.
- [24] E. Goffman, *Interaction Ritual: Essays on Face-To-Face Behavior*. New York: Doubleday, 1967.
- [25] B. Conein, M. De Fornel, and L. Quere, *Les formes de la conversation*, vol. Vol. 1. Paris: CNET, 1990.
- [26] D. De Kerckhove, *Planetary Mind: Collective intelligence in the digital age*. New York: Hard-Wired, 1997.
- [27] D. De Kerckhove and C. J. Lumsden, *The alphabet and the brain*, . New York: Springer Verlag, 1988.
- [28] P. Lévy, *L'intelligence collectif [Collective intelligence]*. Paris: La Découverte., 1994.
- [29] R. Ghiglione and A. Trognon, *Où va la pragmatique*. Grenoble: PUG, 1993.
- [30] J. Siegel, V. Dubrovsky, S. Kiesler, and T. W. McGuire, Group processes in computer-mediated communication, *Organizational Behaviour and Human Decision Processes* **37** (1986) 157-187.
- [31] J. Weedman, Task and non-task functions of a computer conference used in professional education: a measure of flexibility, *International Journal of Man-Machine Studies* **34** (1991) 303-318.
- [32] R. Jakobson, *Essais de linguistique générale [Essays of general linguistics]*. Paris: Minuit, 1963.
- [33] V. N. Volosinov, *Marxismo e filosofia del linguaggio [Marxism and language philosophy]*. Bari: Dedalo, 1976.
- [34] E. Marc and D. Picard, *L'interaction sociale [Social interaction]*. Paris: PUF, 1989.
- [35] D. Anzieu and J. Martin, *La dynamique des groupes restreintes [Dynamics of small groups]*. Paris: PUF, 1971.
- [36] P. Watzlawick, J. H. Beavin, and D. D. Jackson, *Pragmatics of human communication. A study of interactional patterns, pathologies and paradoxes*. New York: Norton, 1967.
- [37] B. Rimé, Langage et communication [Language and communication], in *Psychologie sociale [Social psychology]*, S. Moscovici, Ed. Paris: PUF, 1984.
- [38] P. Charaudeau, *Langage et discours*. Paris: Hachette, 1983.
- [39] A. Trognon, Fonctions de la conversation [Functions of conversation], in *Le dialogue [Dialog]*, G. Maurand, Ed. Albi: L'Union, 1990.
- [40] J. Potter and M. Wetherell, *Discourse and social psychology*. London: Sage, 1987.
- [41] F. Jacques, *L'espace logique de l'interlocution*. Paris: PUF, 1985.
- [42] F. Jacques, La réciprocité interpersonnelle, *Connexions* **47** (1986) 110-136.
- [43] A. Dix, J. Finlay, G. Abowd, and R. Beale, *Human-computer interaction*. New York: Prentice Hall, 1993.
- [44] M. Lea, Rationalist assumptions in cross media comparisons of computer mediated communication, *Behavior and Information Technology* **10** (1991) 153-172.
- [45] R. R. Rice, Media appropriateness - Using social presence theory to compare traditional and new organizationa media, *Human Communication Research* **19** (1993) 451-458.
- [46] J. Short, E. Williams, and B. Christie, *The social psychology of telecommunications*. London: Wiley, 1976.
- [47] R. L. Daft and R. H. Lengel, Organisational information requirements, media richness and structural design, *Management Science* **32** (1986) 554-571.

- [48] R. R. Rice, Contexts of research on organizational computer-mediated communication: A recursive review., in *Context of computer-mediated communication*, M. Lea, Ed. Hemel Hempstead: Harvester-Wheatsheaf, 1992, pp. 113-143.
- [49] P. Curtis, Comunicazione via MUD: i fenomeni sociali delle realta virtuali basate su testo. (Communication via MUD: Social phenomena of virtual reality based on text.), *Sistemi Intelligenti* **8** (1996) 229-253.
- [50] M. R. Parks and K. Floyd, Making friends in Cyberspace, *Journal of Communication* **46** (1996) 80-97.
- [51] P. Curtis, Mudding: Social phenomena in text-based virtual realities, in *Culture of the Internet*, K. Sara, Ed.: Lawrence Erlbaum Associates, 1997, pp. 121-142.
- [52] J. E. Newhagen, Why communication researchers should study the Internet: A dialogue., *Journal of Communication* **46** (1996) 4-13.
- [53] C. Goodwin and J. Heritage, Conversation analysis, *Annual Review of Anthropology* **19** (1990) 283-307.
- [54] S. E. Brennan, Conversation with and through computers, *User modelling and user-adapted interaction* **1** (1991) 67-86.
- [55] G. Mantovani, *New communication environments: from everyday to virtual*. London: Taylor & Francis, 1996.
- [56] E. Rocco and M. Warglien, La comunicazione mediata da computer e l'emergere dell'opportunità elettronico [The growth of electronic opportunism in computer-mediated communication], *Sistemi Intelligenti* **7** (1995) 393-420.
- [57] G. Stasser, Pooling of unshared information during group discussion, in *Group processes and productivity*, S. Worchell, W. Wood, and J. A. Simpson, Eds. Newbury Park, CA: Sage, 1992, pp. 48-67.
- [58] L. Sproull and S. Kiesler, Reducing social context cues: Electronic mail in organizational communication, *Organizational Behavior and Human Decision Processes* **37** (1986) 157-187.
- [59] L. Sproull and S. Kiesler, *Connections: New ways of working in the networked organizations*. Cambridge, MA: MIT Press, 1991.
- [60] V. J. Dubrovsky, S. Kiesler, and B. N. Sethna, The equalization phenomenon: status effects in computer-mediated and face-to-face decision making groups, *Human Computer Interaction* **6** (1991) 119-146.
- [61] L. Adrianson and E. Hjelmquist, Group processes in face-to-face and computer mediated communication, *Behaviour & Information Technology* **3** (1991) 281-296.
- [62] L. C. Austin, J. K. Liker, and P. L. McLeod, Who controls the technology in group support systems? Determinants and consequences, *Human-Computer Interaction* **8** (1993) 217-236.
- [63] H. K. Klein and P. Kraft, Social control and social contract in NetWORKing, *Computer Supported Collaborative Work* **2** (1994) 89-108.
- [64] R. Spears and M. Lea, Social influence and the influence of the "social" in computer-mediated communication, in *Contexts of computer-mediated communication*, L. Lea, Ed. Hemel Hempstead: Harvester Wheatsheaf, 1992, pp. 30-65.
- [65] M. Lea, T. O'Shea, P. Fung, and R. Spears, Flaming in computer-mediated communication, in *Contexts of computer-mediated communication*, L. Lea, Ed. Hemel Hempstead: Harvester Wheatsheaf, 1992, pp. 89-112.
- [66] D. Abrams and M. A. Hogg, *Social identity theory*. Hemel Hempstead: Harvester Wheatsheaf, 1990.
- [67] M. A. Hogg and D. Abrams, *Social identifications: a social psychology of intergroup relations and group processes*. London: Routledge, 1988.
- [68] H. Tajfel and J. C. Turner, The social identity theory of intergroup behaviour, in *Psychology of intergroup relations*, S. Worchell and W. G. Austin, Eds. Chicago: Nelson-Hall, 1986, pp. 7-24.
- [69] J. Turner, M. A. Hogg, P. J. Oakes, S. D. Reicher, and M. S. Wetherell, *Rediscovering the social group: A self categorization theory*. Oxford: Blackwell, 1987.
- [70] T. K. Bikson and J. D. Eveland, The interplay of work group structures and computer support, in *Intellectual teamwork - Social and technological foundations of cooperative work*, J. Galegher, R. E. Kraut, and C. Egidio, Eds. Hillsdale, NJ: Erlbaum, 1990.
- [71] C. S. Saunders, D. Robey, and K. A. Vaverek, The persistence of status differentials in computer conferencing, *Human Communication Research* **20** (1994) 443-472.
- [72] J. E. McGrath, Time matters in groups, in *Intellectual teamwork: Social and technological foundations of cooperative work*, J. Galegher, R. E. Kraut, and C. Egidio, Eds. Hillsdale, NJ: Erlbaum, 1990, pp. 23-61.
- [73] R. R. Rice, Computer-mediated communication system network data: Theoretical concerns and empirical examples, *International Journal of Man-Machine Studies* **32** (1990) 627-647.
- [74] S. A. Caswell, *E-mail*. Boston: Artech House, 1988.

- [75] T. Malone and J. F. Rockart, Computers, networks and the corporation, *Scientific American* **265** (1991) 92-99.
- [76] M. S. Poole and G. L. DeSanctis, Microlevel structuration in computer-supported group decision making, *Human Communication Research* **19** (1992) 5-49.
- [77] M. S. Poole and G. L. DeSanctis, Understanding the use of group decision support systems, in *Organisations and communication technology*, C. Steinfeld and J. Fulk, Eds. Newbury Park, CA: Sage, 1990, pp. 175-195.
- [78] A. Giddens, *The constitution of society*. Cambridge: Polity Press, 1984.
- [79] D. M. Rousseau, Technology in organisations: a constructive review and analytic framework, in *Assessing organizational changes*, S. E. Seashore, E. E. Lawler, P. H. Mirvis, and C. Camman, Eds. New York: Wiley, 1983.
- [80] C. Perrow, *Organisational analysis: a sociological view*. Belmont, CA: Wadsworth, 1970.
- [81] N. S. Contractor and D. R. Seibold, Theoretical frameworks for the study of structuring processes in group decision support systems, *Human Communication Research* **19** (1993) 528-563.
- [82] L. Suchman, *Plans and situated action*. Cambridge, UK: Cambridge University Press, 1987.
- [83] G. Mantovani, Social context in HCI: A new framework for mental models, cooperation and communication, *Cognitive Science* **20** (1996) 237-296.
- [84] R. Harré, Language and science of psychology, *Journal for the Theory of Social Behaviour and Personality* **4** (1989) 165-188.
- [85] R. Harré and L. Van Langenhove, Varieties of positioning, *Journal for the Theory of Social Behaviour* **21** (1991) 393-408.
- [86] B. Davies and R. Harré, Positioning: the discursive production of selves, *Journal for the Theory of Social Behaviour* **20** (1990) 43-63.
- [87] M. Rosaldo, Toward an anthropology of self and feeling, in *Culture theory: Essays on the mind, self and emotion*, R. A. Shweder and R. A. LeVine, Eds. Cambridge, UK: Cambridge University Press, 1984, pp. 124-136.
- [88] F. Hsu, The self in cross-cultural perspective, in *Culture and self*, A. Manella, G. DeVos, and F. Hsu, Eds. New York: Tavistock, 1985.
- [89] J. Bruner, *Acts of meaning*. Jerusalem: Harvard University Press, 1993.
- [90] J. S. Steuer, Defining virtual reality: Dimensions determining telepresence, *Journal of Communication* **42** (1992) 73-93.
- [91] A. R. Stone, Will the real body please stand up? Boundary stories about virtual cultures, in *Cyberspace: First steps*, M. Benedikt, Ed. Cambridge, MA: MIT Press, 1991.
- [92] H. Markus and P. Nurius, Possible selves, *American Psychologist* **41** (1986) 954-969.
- [93] J. Meyrowitz, *No sense of place: The impact of electronic media on social behavior*. New York: Oxford University Press, 1985.
- [94] S. Dohény-Farina, *The wired neighborhood*. New Haven: Yale University Press, 1996.
- [95] K. J. Gergen, *The saturated self: dilemmas of identity in contemporary life*. New York: BasicBooks, 1991.
- [96] R. H. Cutler, Distributed presence and community in Cyberspace, *Interpersonal Computer and Technology* **3** (1995) 12-32.
- [97] W. J. Mitchell, *City of bits*. Cambridge (MA): MIT Press, 1995.