

CHAPTER 2

A Framework for Studying Human Multimodal Communication

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1. Introduction

This chapter provides an overview of some of the most important functions and processes involved in human face-to-face communication. Special attention is given to multimodal communication. It also gives an overview of the most important factors (e.g. social activity, personality and national-ethnic culture) that influence human communication. The chapter provides definitions for communication, language and culture. It discusses the contents of communication and the dynamics of dialog and presents a model of embodied communication, involving several levels of awareness and intentionality. Finally, there is a discussion of the relation between face-to-face communication and communication technology.

2. A Challenge

Due to greater requirement of communication technology in our lives, more issues of human-human communication are being studied now, than ever before.

Keeping in mind that there is still a lot we do not know about human-human communication, the goal of this chapter is to

provide an overview of features in face-to-face communication, which need to be taken into account in constructing both computer-based systems for communication between humans and systems for communication between humans and robots or other artificial agents. In this way, we hope to support the cooperation between computer scientists, engineers, signal processors and communication researchers having a background in the social sciences or linguistics.

3. Nature, Culture, Communication, Cognition and Language

One of the most discussed issues in studying communication concerns the interplay between Nature and culture. What in communication is due to Nature and what is due to culture? Basically, culture is always the result of cultivation of Nature. It is cultivated Nature. Culture, thus, always has a natural foundation, but involves human shaping of naturally given physical, behavioral and cognitive resources. We have natural genetic predispositions for cognition, social bonding, communication and language and through socialization (which is a kind of cultivation) in particular cultures and social communities, we acquire culture-specific, convention-regulated ways of social bonding, thinking, communication and language.

Since our focus in this book is on communication, we start by turning to the question: What is communication? An answer to this question is provided by the following definition: Communication = sharing of information, cognitive content or understanding with varying degrees of awareness and intentionality. For a different definition of communication, Shannon and Weaver (1949) and for a critical discussion of this, Reddy (1979).

Thus, we can say that: A and B communicate if and only if A and B share a cognitive content as a result of A's influencing B's perception, understanding and interpretation and B's influencing A's perception, understanding and interpretation. The influence is mediated through their action and behavior or by the results of their action and behavior, e.g. texts or paintings. (Allwood, 2008b.)

It is here important to note that a person can be informative to another person unintentionally, e.g. when the color of their hair or pitch of their voice provides information about their age or sex, or when blushing gives information about their emotional arousal. Similarly, also perception can be unaware; you could, for example, be influenced by another person without noticing it, as when the person's larger pupil size signals interest and this subconsciously is

interpreted as a signal of friendliness by you. In this way, both you and your interlocutor could influence each other without being aware of it (Allwood, 2002).

A wide notion of communication will include such cases, i.e. unaware and unintentional sharing of information, while a more narrow notion might, for example, require that communication must always be intentional and/or aware.

Two important characteristics of human beings are that they can be, and mostly are, social and often rational. The primary means for sociality and rationality is communication. We can incorporate a little more of this in our definition of communication in the following way:

Communication = sharing of old or new factual, emotive and conative aspects of cognition through co-activation and co-construction of content, information or understanding, occurring as a part of and means for joint social activities involving degrees of coordination in a way which is often multimodal and interactive. This definition incorporates sociality by stressing coordination and collaboration and rationality through the reference to goal-directed activity.

We should also note that even if face-to-face communication is always multimodal and interactive, there are other forms of communication, which are less multimodal, e.g. telephone conversations or exchange of written information (SMS, e-mail, letters, chat) and forms of communication which are less interactive, like reading a book, watching TV or listening to the radio.

Similarly, communication is not always collaborative and cooperative. We communicate also when we are quarreling or compete. In fact, communication is often essential in carrying out both conflict and competition.

It might here be interesting to compare the use of the term *communication* with use of the term *dialog*, which even if sometimes also used in the general sense we have used *communication*, instead often is used in a more restricted sense for non-competitive and non-conflictual communication: "We want dialog, not conflict". To avoid this more narrow interpretation, we will here use "communication" as the general term.

3.1 Language

In order to facilitate communication, mankind has evolved natural languages as our most important means of collective information processing, enabling coordination, collaboration and cooperation.

Using the definition of communication given above, we can define language as follows:

Language = a social convention-based system of communication for the sharing of complex information, using vocal, gestural or written symbols. For other definitions of language, Bloch and Trager (1942) and Everett (2012).

Among languages, so-called natural languages are especially important and can be defined as means of communication for sharing of complex information between people, using vocal, gestural or written symbols that have developed naturally, i.e. without extensive human planning and construction.

Natural languages, thus, contrast with artificial languages, like computer languages, chemical formulae, mathematical formulae and Morse code, but also with intentionally constructed auxiliary languages, like Volapük, Esperanto, Ido and Klingon.

Natural languages have probably been part of human evolution for at least 200000 years and have in this way acquired physical, biological, psychological and social properties, which are combined in complex systems with systemic properties both on an individual and on a collective level.

In general, when we study language and communication, it is useful to distinguish the “expressions”, “contents” and “contexts” of language as three aspects that continuously influence, constrain and reinforce each other.

The “expressions” of language include sound (linguistic sounds), visible behavior (gestures) and artifacts (writing and texts). The three correspond to the three primary expressive modes of language—speech, gesture and writing. While speech and gesture in face-to-face communication have probably evolved together with the development of humans from higher primates, writing is a later cultural development.

All linguistic expressions, whether they are spoken, gestural or written, have a “content”, which has cognitive, emotive and conative aspects; the cognitive aspects involve factual information (from everyday topics to more specialized topics), the emotive aspects involve affective-epistemic attitudes and the conative aspects involve intentions and acts of will. The content also includes features related to social identity and personality and features related to “communication management”. For more discussion of the content of communication, see Sections 4 and 6.

The expressions with their content are used in different “contexts”, that is, settings or situations that have properties that influence both

the production and interpretation of the expressions. This means that linguistic expressions are placed in a context that is multimodal and influenced by a particular activity and culture (see Section 4, below).

4. Functions and Processes Involved in Communication

To communicate involves participating in a number of processes that need to be managed so that the actions and behavior in communication can be adapted successfully in order to reach the goals of communication.

We have therefore evolved several mechanisms for communication management (CM). Two of the most important of these are (Allwood, 2008b):

1. Interactive Communication Management (ICM)
2. Own Communication Management (OCM)

Interactive Communication Management involves means for managing the interaction in communication, while Own Communication Management involves ways of managing your own contributions to communication. Both of these types of communication have subsystems.

Interactive Communication Management, for example

- Turn management
- Feedback
- Sequencing

Own Communication Management, for example

- Mechanisms for choice and planning
- Mechanisms for change

Besides mechanisms for managing communication, there are also the features of the message that is managed. We will call this the Main Message (MM) to differentiate it from the auxiliary messages involved in Communication Management.

An overview of the structure and functions of Human Communication is given in Table 1.

The main message is the reason a contribution to communication was made and can contain communicative acts (for instance, statements, questions and requests), referential content and expressed attitudes that are to be shared with the interlocutor. In relation to the aspects of content mentioned above at the end of Section 3, the communicative acts relate to conative (intention and will) aspects, the referential content relates to factual content and the expressed attitudes relate to

Table 1. Structure and functions of human communication.

Main Message (MM)	Communicative acts
	Referential content
	Expressed attitude
Communication management Interactive Communication Management (ICM)	Turn management
	Feedback
	Sequences
Own Communication Management (OCM)	Choice
	Change

the affective-epistemic aspects. Features, connected with social identity and personality, are more complex and can relate to any aspects.

The interactive communication management features help the interlocutors to successively provide new contributions to be shared. Turn management features help them coordinate their contributions and collaborate in construction of joint content. Feedback processes help them communicate successfully, making sure that they have contact, perceive and understand each other's emotional-attitudinal reactions and contributed content. The sequencing features help them adjust communicative acts to each other in a relevant manner, for example, giving answers to questions, answering expressions of gratitude with expressions of generosity, etc.

Finally Own Communication Management (OCM) processes allow interlocutors to keep their turn while planning (Choice function), for example, by using hesitation words or prolonged duration of syllables or gestures. OCM processes also allow speakers to change what they have said or gestured when they feel the need for this, in such a way that their interlocutor(s) can follow what is going on.

5. Multimodal Communication

As we have already noted, face-to-face communication is multimodal. What this means is that more than one of the sensory modalities and more than one of the production modalities in Table 2 are involved. Even if both perception and production can be multimodal, the basis in multimodal communication is multimodal perception, so that in this sense speech in face-to-face communication can be multimodal since we can both hear and see the activity of the speech organs.

This means that content in face-to-face communication is shared through use of multimodal contributions that normally consist of at least vocal verbal elements (with phonology, morphology,

Table 2. Sensory modalities and production modalities in multimodal communication.

Sensory Modalities	Production Modalities
Sight	Communicative body movements/gestures/writing
Hearing	Voice, speech
Touch	Touch
Smell	Smell
Taste	Taste

lexicon, syntax, semantics and pragmatics) combined with prosody and communicative body movements (Kendon, 2004; Argyle, 1988; Allwood, 2008a).

Multimodality implies multimediality, since the sensory modalities also involve physical media, i.e. optical (sight), acoustic energy (hearing), pressure (touch) as well as molecules affecting taste and smell. In addition, there are other perceptual modalities than the traditional five senses that may be relevant, e.g. modalities for temperature, color, shape, movement, etc.

Studying communication from a multimodal perspective leads to a deeper understanding of many processes connected with communication. Two of these are:

- (i) **Multimodal integration** (sometimes, with a metaphor from physics, also called information fusion). Multimodal integration concerns how we can integrate information from our separate sensory modalities with our memory sources to form a common complex multimodal experience. For instance, in a normal conversation, we integrate what we see (colors, shapes and movements), what we hear, touch and smell with what we epistemically and emotionally experience. Furthermore, this is all integrated with other, already stored information we have in our memory concerning our interlocutor and about what he/she is saying or doing.
- (ii) **Multimodal distribution** (with another metaphor from physics, this is sometimes called information fission). Multimodal distribution concerns how we distribute what we want to communicate or do, using several production modalities. If I want to tell you that I am happy to see you, my message will be distributed into a vocal verbal aspect, a prosodic (intonation, tone of voice) aspect, a gestural aspect (face, head, arms, torso, etc.) and possibly a touch and smell aspect. How exactly these different aspects are related to each other is one of the questions still to be resolved in the study of multimodal communication.

In many contexts, flexibility in the choice of modality is needed. Multimodality gives us this flexibility, and also the possibility of being redundant when this is needed, for example, in a complex noisy environment.

Building on the definition of communication given above and building on the notion of multimodality, we can now give a definition of multimodal communication.

Multimodal communication = co-activation, sharing and co-construction of information simultaneously and sequentially through several modes of perception (and production) (Allwood, 2008a).

In Table 3, we give an overview of how dimensions of production and perception can be related in multimodal communication.

The combination of dimensions can be simultaneous or sequential, occur on varying levels of consciousness and intentionality and involve several communicative orientations (see below).

As we can see from the table, communication can involve many types of communicative expressions over and above the auditory aspects of speech. Table 4 gives an overview (Allwood, 2002).

Most of these expressions can supplement auditory aspects of speech or play an autonomous role in communication.

Table 3. Multimodal face-to-face communication—Perception and production.

PERCEPTION	Hearing Understanding + Attitudinal Reactions	Vision	Touch	Smell Smell	Taste
PRODUCTION SPEECH:					
Prosody/Phonology	x	x			
Vocabulary	x				
Grammar	x				
GESTURES:					
Facial gestures		x			
Manual gestures		x			
Body movements		x			
Posture		x			
Touch			x		
Smell				x	
Taste					x
Medium	acoustics	optics	physiology	molecules	molecules

Table 4. Communicative expressions over and above auditory aspects of speech.

1.	Facial gestures (nose, eyebrows, cheek, forehead, chin, etc)
2.	Head movements
3.	Gaze direction, mutual gaze
4.	Pupil size
5.	Lip movements
6.	Hand and arm movements
7.	Leg and foot movements
8.	Body posture
9.	Distance between communicators
10.	Spatial orientation
11.	Clothing and bracelets
12.	Touch
13.	Smell
14.	Taste
15.	Non-linguistic sounds

6. Contents of Communication

As we have seen in Sections 3 and 4, the content of language and communication has many features. We will now consider these features a little more in detail. Perhaps the most important types are information concerning:

- (i) Physiological states, like fatigue and hunger
- (ii) Character—identity—personality, like haughty, timid, aggressive
- (iii) Affective-epistemic attitudes (including emotions), like joy, friendliness, surprise, boredom, interest, etc.
- (iv) Factual content, giving information about our beliefs and assumptions concerning facts
- (v) Communication management, that is, information about ICM (feedback, turn taking, sequences) and OCM (choice and change).

In many contexts, the verbal part of the auditory, mostly vocal message is the most important. However, for all the types of content, especially the first three types, both prosody and communicative body movements have a major role. Thus, in contexts where information about physiological states, personality or affective-epistemic states is in focus, the importance of prosody together with visible body movements

increases. Prosody and visible body movements are also very important for information structure, that is, structuring a message with regard to what is important and needs attention and what can be back-grounded and presupposed. If we compare the list of contents just given for speech with possible contents associated with visible body movements, we find that visible communicative body movements can activate and help share information of all the types mentioned, but, like prosody, they are especially important for all the dimensions of content not concerned with factual information, especially emotions and attitudes. Perhaps this points to a close evolutionary relationship between prosody and gesture.

6.1 Affective aspects of content

Communication does not only involve sharing of factual information. It also involves sharing of attitudes and emotions. To some extent, attitudes and emotions are part of what is shared in all types of communication. However, in some types they are perhaps the main focus, like in small talk, quarrels or love making, while in others, like a scientific lecture, they have a more subordinate role. Since they are so pervasive, they play a major role in what we express in communication which means that understanding how affective-epistemic attitudes, like interest, surprise, boredom, uncertainty, friendliness or amusement, are indicated, displayed or signaled (see below) and what reactions, perceptions, understandings and responses they give rise to is essential. Some of the main modes of interaction, like coordination, collaboration, cooperation, competition and conflict, all depend on emotions and attitudes. If we want to understand and facilitate these modes of interaction, we must understand the role of emotions and attitudes in communication.

6.2 Content in small talk

Social contact is a basic human need. Human beings need social contact to fully develop. Social contact involves communication. The content shared in communication can be more or less important. In some situations, social contact can be more important than the actual content shared. Contact with other persons becomes the primary motive for communicating and the topics chosen for communication in this kind of situation will tend to be such that, depending on culture and other circumstances, they are seen to be of neutral, general relevance, like the weather, sports, television, politics, economy or family. "Small talk" of this kind has sometimes been called "phatic communion" (cf. Malinowski, 1922), from the Greek (phatos—speech), where the idea is that "phatic communion" is a kind of fellowship,

or sharing through speech, where the main function is social contact and emotional togetherness.

7. Communicative Orientation

Every contribution to a dialog has several communicative orientation functions. The four most important types are (Allwood, 2000):

- (i) One or more responsive functions (all contributions except the first)
- (ii) One or more expressive functions, mostly involving the expression of emotional or epistemic attitudes
- (iii) One or more evocative functions
- (iv) One or more referential functions.

The four communicative orientations can be seen in Figure 1 below.

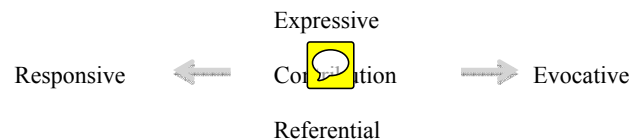


Figure 1. The communicative orientations of a contribution.


Besides these four types of functions, contributions have an “information structure” (see Section 6, above) helping to focus attention on new or noteworthy parts of a contribution and to defocus other aspects, which can be taken for granted to a greater extent.

7.1 Dynamics of dialog

Building on the orientation functions introduced above, we can better understand what drives dialog forward by considering the interplay between the evocative and the reactive/responsive functions of contributions. The double term “reactive/responsive” is used to include both reactions that are automatic and unaware and responses that are more deliberate. The evocative and reactive/responsive functions work like two cogwheels, linking into each other. The evocative functions of Speaker A trigger the reactive/responsive functions of Speaker B who then makes another contribution in which the first part usually is mainly responsive and the second part mainly evocative. Combined with the expectations connected with particular social roles, the two types of functions give rise to the commitments

and obligations connected with the roles of main communicator (speaker) and co-communicator (listener) for all participants as they alternate between these two roles. See Table 5.

Table 5. Dynamics of dialog: Two cog wheels linking into each other.

	Expressive		Expressive
	contribution 1 Evocative 		contribution 2 Evocative
Reactive/Responsive	Referential	Reactive/ Responsive	Referential
	Communicator Obligations and commitments		Co-communicator Evaluation obligations

An example of the functions is given below in a short exchange of two contributions between A and B, waiting for the bus on a rainy morning

- A: always raining in Gothenburg
 B: (nodding) mm yeah it is
 (depressed)

We start by analyzing A's contribution

- (i) *Reactive/responsive*: Since this is the first contribution, there is no previous contribution to respond to. However, one might say that A's contribution is a response to the situation at hand with B present as a potential co-communicator.
- (ii) *Expressive*: A is making a predication, which in this particular situation functions as a statement expressing A's belief about the weather (belief is an epistemic attitude).
- (iii) *Referential*: A refers implicitly, through the predication, to the meteorological situation.
- (iv) *Evocative*: The evocative functions of A's contribution can be described as Contact, Perception, Understanding (CPU) and sharing of belief, i.e. by making the contribution, A is seeking contact with B by attempting to make B perceive, understand and share the belief expressed by A's contribution.

Besides the orientation functions of A's contribution, A is also creating a normative relation with B, which can be described as follows: Being a speaker, A considers B cognitively and ethically, considering questions like: Does A really want to contact B?, Is it ok to contact B?, Will B be able to understand? Over and above these normative requirements, A's contribution also contains an implicit

commitment to the belief that A is expressing through the predication in the contribution. This is what in diagram 3 is called “obligations and commitments” of a communicator.

If we turn to B’s contribution, B, in the co-communicator role, first carries out a conscious and less conscious internal appraisal and evaluation of A’s contribution and then switches to the communicator role and produces behavioral reactions and responses related to A’s contribution. In the co-communicator role, B needs to evaluate his/her own willingness and ability to react to the evocative functions in A’s contribution. Can and does he/she want to continue, perceive, understand and share the belief that A is expressing and how does he/she react to this emotionally and epistemically? This is what in Figure 3 is called “the evaluation obligations” of the co-communicator. On the basis of an evaluation/appraisal of this type, B then provides a reaction/response to A’s contribution which then are subject to the “obligations and commitments” of a communicator.

B: (nodding) mm yeah it is (depressed)

The functions of this contribution can be described as follows:

- (i) *Reactive/responsive*: Through the nodding in combination with the feedback words *mhm, yeah*, B expresses contact, perception and understanding (CPU) (I am willing to have contact, perceive and understand).
- (ii) *Expressive*: B’s responsive functions are also expressive, so his/her contribution also expresses contact, perception and understanding. In this case, this is done with depressed facial gestures and tone of voice. In addition, by the word *yeah* and reformulation *it is* of A’s implicit statement, B expresses his agreement and own belief in the meteorological state described by A (shared belief).
- (iii) *Evocative*: Like A’s contribution (and like most contributions), B’s contribution is an attempt to evoke continued contact, perception, understanding and shared awareness (belief) of B’s sharing of A’s belief. It is, thus, an attempt to evoke a belief about a belief in A, i.e. A should become aware that B shares his belief.

In other words, even small talk with a simple exchange of information about the weather, like the one above, involves what is sometimes called mentalizing and reliance on a so-called theory of mind (Frith and Frith, 2010), allowing a quick build-up of shared beliefs and emotions. This is, to a very great extent, done through use of multimodal feedback

mechanisms, which consist of a combination of small words like *m*, *mhm*, *yeah*, *ok*, head movements, gaze and facial gestures.

8. An Interactive View of Embodied Communication

In face-to-face communication, we can say that communicators form a more or less integrated dynamic system by establishing communication links on several levels of intentionality and awareness. Figure 4 below presents a simplified model of such a system, involving two communicators (Allwood et al., 2008).

The figure shows two communicators, A and B, who are communicating on several levels of awareness and intentionality. In actuality, awareness and intentionality probably vary continuously from no awareness or intentionality to higher degrees of awareness and intentionality. However, in the model, we distinguish three levels that have somewhat different properties (Allwood, 2008b).

On the level that is least aware and intentional (the indicative level), A is influencing B, without intending to do so, or even being aware of doing it. Similarly, B is being influenced, but is not really aware of this happening.

On this level, subconscious or perhaps better non-conscious reactions and appraisal can take place. Usually, these processes are quick and lead to responsive behavioral reactions that are hard to control. One word for this is “automatic”. In general, the model predicts that the more aware a process is, the slower it will be and the easier it will be to control and the less aware it is, the quicker it will be and the more difficult to intentionally control it will be. On the lowest level of awareness, there are many partly overlapping processes that are basic to communication, like co-activation, mirroring, priming, alignment and emotional contagion (Pickering and Garrod, 2004; Arbib, 2002; Tarde, 1903).

On the middle level (the display level), the sender is more aware of what he/she is doing and more in control of his/her behavior. Here, the basic communicative intention (Allwood, 2002, 2008b) is to display or show something to the interlocutor. There are several kinds of display. Often behavior, which has been initiated as indicated and automatic, gradually becomes aware and can then be reinforced by more aware and intentional display.

On the recipient side, the model also predicts degrees of awareness and intentionality, extending from the non-conscious processes already described above to more aware processes involving discrimination and identification of stimuli as separate from each other.

On the third, or most intentional and aware level (the signal level), processes are slower, more aware and deliberate than on the lower levels. The main communicator can now engage in what we will call signaling, which involves not only displaying (showing) something, but also intending that the recipient becomes aware that something is being displayed. Using language normally involves this level of intentionality and awareness, since language is a system for communication that conventionally presupposes “signaling” to a recipient. Linguistic expressions are conventional “signals” or conventional means for displaying that you are displaying (showing that you are showing).

On the recipient side, signaling is related to better perception and understanding. On this level, the recipient moves beyond discrimination and identification to understanding, which in the model is equivalent to connecting perceived input information to stored background information in a meaningful way. Understanding linguistic expressions provides a special case of this process that can be brought out by considering the case of trying to understand a language you don’t know. Imagine you hear (or see) the phrase *hao che* from a Chinese person and don’t know Chinese. You will probably be able to discriminate and to some extent identify the sounds, but you will not be able to understand, since you cannot connect your perceived input to an already stored background in a meaningful way. However, if you know Chinese, you will be able to do this and understand what is being said. Now compare this example to hearing

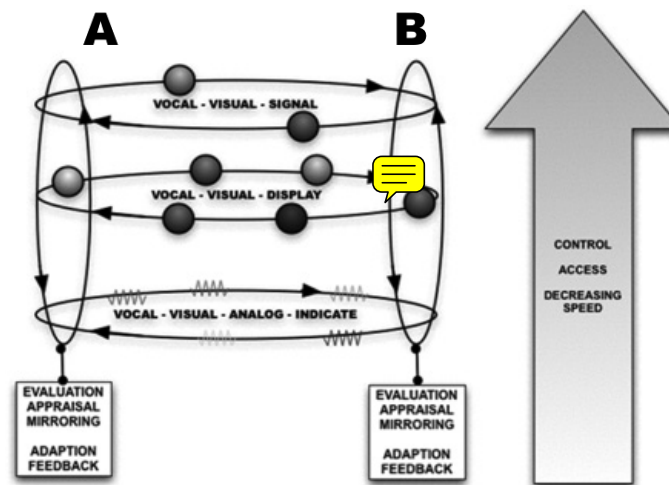


Figure 2. A dynamic system of communication, involving two communicators and three levels of co-activation, which influence each other.

an English speaker saying *delicious* while eating. In this case, you can probably connect what you perceive to already stored information, enabling you to understand what is being said.

Analyzed this way, understanding linguistic expressions can be seen as a special case of understanding in general, which always involves connecting input information to stored background information in a meaningful way. The depth of understanding is dependent on the extent to which such connections can be made, where more connections mean increased depth of understanding. Understanding a phenomenon means becoming aware of how the phenomenon relates to other phenomena.

In communication, one particularly interesting type of connection, relevant both for production and understanding, relates input information to stored information concerning the social activity that is being pursued. This is done in such a way that the activation involved in perception and understanding involves predictions about what the relevant next stage of the activity could be which means that relevant responses can fairly rapidly be activated and given. In this way, communication relevant to a particular social activity can be driven forward by relevant co-activation on several levels of awareness (Allwood, 2000).

9. Activity, Personality and Culture

9.1 Factors that influence communication—Activity

Actual communication is always multi-causally influenced. Communicators have multiple overlapping roles and purposes that are given by culture, age, gender, occupation and not least activity. They can draw on many communicative resources even in a particular activity, which means that the activity can contain types of communication, which are not strictly speaking part of this activity. A very common example of this is small talk (see above), which can be a part of as diverse social activities as a patient-doctor consultation or a negotiation between politicians.

Thus, there are many factors that influence and are influenced by the way that contributions are produced and understood in dialog. Consider for example the factors influencing a German politician negotiating with a French politician in the context of the European Parliament in Strasbourg. Starting from a general level, we have the influence of human nature and the external physical environment. On a slightly less general level, there is a particular national culture

(German and French, European) and its associated language (French, German or English with possible interferences from German or French) to consider. On the next level, there are social institutions, like organizations (European Parliament) and above all social activities. In this case, the activity is “negotiation”. All of the mentioned factors enable us to have certain expectations and make predictions about the behavior of the two politicians.

Social activities, like negotiations, are one of the most profound types of influence on communication (Allwood, 2000). We communicate in very different ways, depending on whether we are talking to colleagues in a project meeting, participate in a lecture, are trying to sell something to a customer, are interviewing someone or are trying to flirt with someone.

All of these activities can be described and analyzed using the following activity parameters:

- (i) Purpose, e.g. formal meeting
- (ii) Roles of participants, e.g. chairman, secretary, participant
- (iii) Procedures, media and other instruments
- (iv) Environment (organizational and physical)

However, besides the roles that communicators have in such activities, their communication will also, as already mentioned, be influenced by participant characteristics, such as organizational position, gender and educational background.

But over and above, the mentioned factors, the interaction itself, in many ways, is decisive; as it goes through particular sub-activities or phases, using exchange units as exposed through the particular contributions of the negotiating politicians. In the end, as we have seen above, it is these individual contributions with their more or less aware features in terms of evocative and reactive/reactive functions that drive dialog forward, employing several levels of intentionality and awareness.

Let us now turn to two of the factors that, besides social activity, have an influence on communication, namely personality and national-ethnic culture.

9.2 Personality

One of the factors, often thought to influence communication, is personality (identity or character) which can be described as a characteristic set of holistic biographical, psychological and social features regarded as long term and typical of a particular person.

Often personalities are described in terms of emotional attitudes such as warm, cold, generous, stubborn, dominant, shy, aggressive, easy-going, etc., traits that are often assumed to have fairly direct communicative consequences, so that a warm person shows warmth in communication, while a dominant person attempts to dominate.

Theories of personality vary (Hall and Lindzey, 1957) in how permanent or malleable personality features are assumed to be. Some theories see them as always present, based on a genetic disposition or early child development, while others see them as highly fluctuating, based on the type of interaction developed in a particular communicative situation.

9.3 Cultural influence

We have seen above that national-ethnic culture is among the influences on communication. Perhaps this is especially interesting, when two or more persons with different cultural backgrounds communicate and we have what is often called “intercultural communication”.

Reflecting on intercultural communication raises the question of what culture is (Kroeber and Kluckhohn, 1952; Geertz, 1973; Allwood, 1985). We can define the culture of a community as their shared patterns of thoughts, behavior, artifacts and traces in the environment, based on, but not determined by, Nature. Thus, the ability to breathe or to walk, although shared in all human communities, is not cultural, since it is directly given by Nature. Culture is based on Nature, but requires humans to create regularities not directly given by Nature. Since such created regularities can differ between communities, they are in many cases relevant for communication. They affect both behavior, activities and the assumptions communicators have about what they can take for granted as shared. Such assumptions are often automatic and can, if not made aware, lead to misperceptions and misunderstandings between interlocutors.

Cultural traits and differences can influence all aspects of communication, that is, production, interpretation, interaction and assumptions about context, for example, assumptions about the proper, or polite, way to carry out various social activities, like greeting, e.g. thanking, introducing yourself, getting to know someone, negotiating, etc.

Our awareness of cultural traits, as well as of cultural differences, often takes the form of more or less stereotypical generalizations concerning what is common or normal on a group level. If seen this way, cultural traits become not deterministic causes valid for

every individual. Individual members of a culture may always be exceptional. Assumptions about cultural traits and cultural differences must therefore always be made with caution and checked for validity.

Since cultural differences may have an influence on all aspects of communication, this means that they can have an influence on both main message features (choice of communicative, referential content and expressed attitudes) and features of communication management (turn management, feedback, sequencing, i.e. ICM, choice and change management, i.e. OCM). See above. They may, for example, influence the frequency and the way in which we move our head in order to give positive or negative feedback to our interlocutor or the way in which we hesitate in order to keep the floor.

A very clear example of differences in the main message part of a contribution concerns the content different languages allow us to express in different social activities. What may be easily and directly expressed in one language may perhaps only be awkwardly expressed by paraphrase, if at all, in another language. Usually, differences of this sort reflect the fact that what has been in focus and conceptually developed in one culture and language need not have been of interest and developed in another culture and language.

Cultural differences can concern different types of relations between interlocutors, like power and trust relations. Cultures vary with regard to how much power and what type of power is connected with different social relations, like boss—employee, parent—children or doctor—patient. Likewise, they vary with regard to how much and who you trust. Do you trust your parents, your children, your boss, your employees, your doctor, your patients, the police and your politicians?

Also ethical aspects of communication can be subject to cultural differences. When and to what extent is it acceptable to lie to other people? When and to what extent is it acceptable to hurt other people? Can you lie to or hurt your parents, your children, your spouse, your boss, your employees, your doctor, your patients etc.?

9.4 Culture and activity

Activity parameters like purpose, roles of participants, procedures, media and other instruments as well as environment (organizational and physical) are to some extent different in different cultures: This can play a role for the communicative behavior in the activity and can be seen in features of communicative acts, interpretation and interaction patterns. Thus, cultural differences can be found, for example:

- (i) In role expectations, e.g. concerning power, respect, politeness, and in the manner in which power or politeness is expressed.
- (ii) In the sequences opening or closing an activity, e.g. in sequences of greeting, introduction and leave taking.
- (iii) In turn management and feedback.
- (iv) In what is seen as the purpose of a given activity, especially concerning non-explicit purposes.
- (v) In environmental features like the occurrence of (and attitudes to) cleanliness, dirt, noise and silence. In connection with the environment, it is also interesting to consider natural factors, like the climate or topography that can have an influence on culture and communication.

Investigations of how culture and social activity influence communication should therefore, if possible, be combined. Otherwise there is a clear risk that behavior attributable to an activity difference is attributed to a cultural difference and vice versa.

10. Face-to-face Communication and Communication Technology


What happens when we introduce communicative technology into face-to-face communication? (Allwood and Ahlsén, 2012.) Today, there are many types of communication technology, for example, writing, radio, TV, electronic audio-video communication (Skype, Youtube etc.), email, chat, Facebook and mobile communication devices of many types. Some of these support human-human communication, while others involve communication with a virtual agent (games, tutoring systems), a robot or bot. Many new devices for picking up information have been developed: e.g. sensors for GPS, galvanic skin responses, heart beat and brain activity (for example, Zhang et al., 2006).

Two questions that will be with us for a while and periodically need to be asked again are: What is missing and what are the consequences of new communication and information technology for communication?

As an example of the effects of communication technology, let us consider the extent to which communication involves synchronization in time and space. See Table 6, below.

The table shows how communication technology has enabled us to bypass the constraint of co-presence in time and space, which is a feature of face-to-face communication. But there is a price to pay for this. Some features of face-to-face communication are lost. So far, lack

Table 6. Communication technology and synchronization in time and space.

TimeSpace 	Same Time	Different Time
Same Location	1. Face-to-face communication	3. Bulletin board
Different Location	2. Phone, Video and audio conferencing, Skype, Chat	4. Writing (letters, email, fax), Voice mail, Blog, Internet, Recording devices

of synchronization has also led to less redundancy, less multimodality, less non-aware sharing, less interactivity and less complexity of certain types. It has, of course, also had positive effects like bridging time and space, i.e. sharing of information across points in time and locations in space. These were a motive for developing the technology in the first place.

Regarding human involvement in communication, communication technology can have two basic functions:

- (i) It can be supplementary, supporting human-human communication. The bridging of time and/or space discussed above are probably the clearest examples of this. Other examples are the online availability of a database or other kinds of information not normally available in face-to-face communication.
- (ii) It can replace humans in communication.

Here again, there are two basic cases:

- (i) Replacing one or more humans by a VR agent or a robot. This can be done, for example, for provision of services, like a travel agent, an information officer, an artificial companion, etc., and will involve bridging time and/or space. In every case, we have to ask questions. What properties need to be modeled in the VR agent or robot to provide the service? Do we want features over and above what is necessary for the service? What human features need to be recreated? Here, an interesting problem is the topic we have been discussing in this chapter—what human features are presupposed by language and communication. This is the information we need if we want the artificial agents to communicate like humans.
- (ii) Replacing several humans perhaps, perhaps all, by bots who act as electronic representatives, servants or spokespersons for humans. Again, we can ask questions about what properties need to be modeled in the bot-agents to enable them to carry out the tasks for which they are made, especially if the tasks involve language and communication.

11. Conclusions

In this chapter, we have presented an overview of some of the main features of human communication and some of the factors that influence these features in different situations. We have stressed that many of the features work more or less automatically at a low level of awareness and intentionality and that this provides a special challenge for communication technology.

In general, a better understanding of the features of human-human communication gives us a better basis for evaluating which of these features we want to enhance, leave out or emulate through development of communication technology. This, in turn, makes it possible to develop criteria for evaluation of communication technology, something that is becoming more and more necessary, given the steadily increasing amounts of technology that are available.

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