

6 On the Nature and Role of Intersubjectivity in Human Communication

Maurizio TIRASSA, Francesca Marina BOSCO

Abstract. We outline a theory of human agency and communication and discuss the role that the capability to share (that is, intersubjectivity) plays in it. All the notions discussed are cast in a mentalistic and radically constructivist framework. We also introduce and discuss the relevant literature.

Contents

6.1	Introduction.....	81
6.2	The mental nature of human communication.....	82
6.3	Human agency	88
6.4	Communication.....	91
6.5	Acknowledgment	93
6.6	References.....	93

6.1 Introduction

Human communication is a complex type of interpersonal activity that is neither reducible to the mere use of language nor to just an instance of "general", undifferentiated intersubjectivity. While it is obviously related to the latter faculty, often related to the former, and almost always interleaved with both, it needs an analysis of its own.

In this paper we will outline one such analysis. Since, of course, we are not the first to do so, we will also discuss the relevant literature.

The main points that we will advance are:

- (i) human communication has to be understood in terms of the mental processes involved in it; such processes are, at least in part, specific to communication, so that it is better characterized as a faculty than as a task or as merely something that humans do;
- (ii) communication consists, at least in part, in the creation and the maintenance of a particular type of intersubjectivity which we will characterize in terms of public, or shared, meanings; public meanings have to be understood primarily

Support us – Ask your institution/library/department to order our books or to apply for series membership - ISSN 1566-7677

To order a book
contact by fax or
by e-mail the offices
below:



IOS Press, Inc.
4502 Rachael Manor
drive
Fairfax, VA 22032
U.S.A.
Tel.: +1 703 323 5600
Fax: +1 703 323 3668
sales@iospress.com

IOS Press
Nieuwe Hemweg 6B
1013 BG Amsterdam
The Netherlands
Tel: +31 20 688 3355
Fax: +31 20 620 3419
info@iospress.nl

IOS Press,
c/o Ohmsha, Ltd.
3-1 Kanda Nishiki-cho
Chiyoda-ku
Tokyo 101
Japan
Fax: +81 3 3233 2426
(Books only)

IOS Press/
Gazelle Book Services Ltd
White Cross Mills
Hightown
Lancaster LA1 4XS
United Kingdom
Tel.: +44 1524 68765
Fax: +44 1524 63232
sales@gazellebooks.co.uk

Enacting Intersubjectivity

A Cognitive and Social Perspective on the Study of Interactions

Volume 10 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: F. Morganti, A. Carassa and G. Riva

May 2008, approx. 280 pp., hardcover

ISBN: 978-1-58603-850-2 **NEW**

Price: US\$161 / €115 / £81

From Communication to Presence

Cognition, Emotions and Culture towards the Ultimate Communicative Experience

Festschrift in honor of Luigi Anolli

Volume 9 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: G. Riva, M.T. Anguera, B.K. Wiederhold, F. Mantovani

September 2006, 323 pp., hardcover

ISBN: 978-1-58603-662-1

Price: US\$161 / €115 / £81

Global Data Management

Volume 8 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: R. Baldoni, G. Cortese, F. Davide and A. Melpignano

July 2006, 376 pp., hardcover

ISBN: 1-58603-629-7

Price: US\$161 / €115 / £81

The Hidden Structure of Interaction

From Neurons to Culture Patterns

Volume 7 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: L. Anolli, G. Riva, S. Duncan Jr. and M.S. Magnusson

May 2005, 304 pp., hardcover

ISBN: 1-58603-509-6

Price: US\$161 / €115 / £81

Ambient Intelligence

The Evolution of Technology, Communication and Cognition Towards the Future of Human-Computer Interaction

Volume 6 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: G. Riva, F. Vatalaro, F. Davide and M. Alcañiz

January 2005, 316 pp., hardcover

ISBN: 1-58603-490-1

Price: US\$161 / €115 / £81

Being There

Concepts, Effects and Measurements of User Presence in Synthetic Environments

Volume 5 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: G. Riva, F. Davide and W.A. IJsselstein

2003, 344 pp., hardcover

ISBN: 1-58603-301-8

Price: US\$161 / €115 / £81

Say not to Say: New Perspectives on Miscommunication

Volume 3 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: L. Anolli, R. Ciceri and G. Riva

2001, 288 pp., hardcover

ISBN: 1-58603-215-1

Price: US\$161 / €115 / £81

Towards CyberPsychology

Mind, Cognition and Society in the Internet Age

Volume 2 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: G. Riva and C. Galimberti

2001, 326 pp., hardcover

ISBN: 1-58603-197-x

Price: US\$161 / €115 / £81

Communications Through Virtual Technologies

Identity, Community and Technology in the Communication Age

Volume 1 Emerging Communication: Studies on New Technologies and Practices in Communication

Edited by: G. Riva and F. Davide

2001, 292 pp., hardcover

ISBN: 1-58603-162-7

Price: US\$161 / €115 / £81

- as part of the interactants' mental events and only secondarily as (a peculiar type of) material activity;
- (iii) all the notions involved should be cast in a mentalistic, biological, and radically constructivist framework.

6.2 The mental nature of human communication

6.2.1 Communication as message

The first contemporary theory of communication was advanced by Shannon and Weaver [1]. In their account, a communicational event occurs when a sender codes a message into a signal and broadcasts the latter to a recipient, who decodes it and recovers the message contained.

This theory relies on a realist conception of meaning and of the relations between mind and world and between mind and mind. Signals materially exist in the world and are, in a sense, independent of both the sender and the recipient. The relation between messages and signals is bidirectional and mechanical: given the one, the other is immediately available to whomever knows the code involved.

In Shannon and Weaver's theory, furthermore, the interlocutors are separate: one launches her message like a signal in the bottle, with no expectations about the other recovering and interpreting it. All that is safe is that, if the signal survives the noise in the channel and gets recovered by someone who knows the code, it will be correctly interpreted.

While clear traces of this approach survive in the theories that accept the notion of literal meaning and the separation between syntactic, semantic and pragmatic levels or components of communication, it is commonly said to have been integrally demised after the work of Wittgenstein [2], Grice [3], Austin [4], and Searle [5, 6]. These authors, rooted in philosophy rather than in engineering or cybernetics, and their followers in the different disciplines that study human communication have instead emphasized a view of communication as (a particular type of) social activity, grounded in cooperation and in the reciprocal recognition of agency and mentalization as well as, more recently, in the different notions that go under the label of intersubjectivity.

Since the very notions of action, social action, and intersubjectivity are far from being clearly or unanimously defined, it may be worth to try drawing some distinction.

6.2.2 Communication as cooperation

Grice [7] identifies some features of cooperation which he summarizes in a well-known set of principles. These principles or maxims, whose nature some have considered descriptive and others normative, are rooted in more general principles of rationality and embodied in the reality of human interactions.

This conception has been highly influential in successive theorizing. Most research on communication in classical artificial intelligence and cognitive science [8, 9, 10] has substantially mapped the notion of communication onto the contents of dialogue and the latter onto the joint activities that can be carried about by the interactants. Examples are conversations between a novice and an expert about the

maintenance of an appliance, or between a clerk in the information booth of a railway station and a traveler about departure and arrival timetables. Here communication is intrinsically cooperative, because so are the collaborative plans in the service of which it exists.

The problem with this approach is that strictly task-oriented dialogues are only a small subset of the human possibilities of communication. To map the latter onto the former means to miss all the cases where communication is not in the service of a predefined joint task. Furthermore, there is no reason to think that benevolence and collaboration are built-in features of communication or anyhow intrinsic to it or necessary for it:

- (1) Ann: You are... You are... I just can't find the words to express my anger!
Bob: "Moron" seems too weak here. What about "filthy scumbag" or "dirty rat"?

However, many researchers argue that communication is a collaborative activity even when the broader activities in which it is embedded are not, and that the view that "good old-fashioned AI" has of the role of cooperation in communication is not the only possible.

For example, Airenti, Bara e Colombetti [11] draw a distinction between a level of cooperation that they call behavioral and one that they call conversational. The former concerns the more or less collaborative nature of the individual action plans which each interlocutor entertains; the latter concerns the forms of the dialogue to which such plans give rise. Cooperation exists on the conversational level even when it does not occur on the behavioral level:

- (2) Ann: Listen, Bob, can you please lend me a couple thousand euro?
Bob: I am very sorry, Ann, but I've had some expenses lately.

According to Airenti, Bara and Colombetti, the two types of cooperation have different origins and ought to be understood on different grounds. Behavioral cooperation is related to the unfolding of the individual plans and the social events in which the interlocutors are engaged; conversational cooperation is instead related to the partly joint management of the processes involved in the generation and the understanding of the relevant speech acts. Only the latter would be intrinsic to communication proper.

Actually, it is often argued that human communication consists in, or at least includes, events that are collaborative not, or not necessarily, on the level of the individual macro-plans (like trying to borrow, or refusing to lend, amounts of money), but also, or exclusively, on the level of the material actions brought about within the dialogues to which such plans give rise (like asking questions or giving replies).

For example, researchers in ethnomethodology and conversational analysis have empirically identified and described collaborative phenomena occurring in the management of turn-taking, that is of how the interlocutors trade and exchange their respective turns of intervention in the ongoing conversation [12], and of the repair system, that is of how they amend a troublesome turn or request that it be amended by the partner [13, 14, 15]. These studies have then been generalized to the study of adjacency pairs: couples of turns, produced by two different

participants, the second of which is conditionally relevant, given the first.

It turns out that in real conversations, like in dancing or in shaking hands, the actions of each participant are tightly coupled to the actions of the other(s) and can only be fully understood in their light. Conversation thus appears to be an interactional micro-world that follows rules of its own, relatively independent of other events and of the overall mental dynamics of the interactants.

This way, communication has ended up to be viewed as taking place on a common ground [16, 17, 18, 19] made up of the set of utterances produced by the interactants up to the present time, possibly with their presuppositions and implicatures. Utterances are material joint actions, emerging from the intertwining of the partial actions that are produced by each participant: such partial actions have neither structure nor sense if taken in isolation, but acquire both structure and sense as they are interwoven with the corresponding actions produced by the partner(s). The intrinsic structure of communication thus consists largely in the construction, management and maintenance of the common ground.

The ability to move on a ground which is in common with a partner is then viewed as a particularly important feature of the more general human capacity for intersubjectivity. We thus arrive to one of the possible meanings of this notion: here, intersubjectivity is defined as the capability to share and bring about joint collaborative actions with a partner [20, 21, 22, 23].

These acceptations of communication and intersubjectivity give rise to some problems. The first is that they only apply to interactions which take place in copresence (at least virtually, if telephone conversations are to be included in the picture) and in which all participants have equal rights of intervention.

This, however, is not always the case. Human beings can communicate beyond the barriers of time and space: they leave notes and write documents for someone else to read in an elsewhere and an elsewhere when they are often unable to foresee, they give lectures where it is considered impolite of someone in the audience to interrupt the speaker, they broadcast television news when such interruption just cannot possibly occur, they send messages in bottles, and so on. We do not want to deny the importance of face-to-face interactions, or the reasonable hypothesis that they have been the first communicative mode evolved in our species; yet, it would be a mistake to define human communication by looking at their local features.

It might be objected that, when communicating unidirectionally, we somehow simulate or impersonate the participation of the audience: this is likely very close to what really happens, but, since such personation seldom, if ever, manifests itself as material actions of simulated co-participation, we are left again with the need to describe communication in terms of its underlying mental dynamics, and not of the material actions that may or may not represent its behavioral counterpart.

The general point here is that communication has to be understood primarily as a mental phenomenon, rather than a material one. Suppose that one morning, while Bob is dressing to go to work, Ann looks out of the window and says:

(3) Ann: It looks like it's going to rain

and that Bob then decides to take an umbrella with him. Bob's problems are: should I consider what Ann has done as communicative, for a start? and why has she said that? what stance should I take toward what she has meant? By necessity,

his interpretation of Ann's action as a suggestion to take an umbrella will be uncertain: for what he knows, she might have meant something very different, like "don't bother to water the flowers before going to work."

To make things worse, Ann might have done something much more ambiguous to the same effect, like moving the tent away from the window so to let Bob see a cloudy sky, or cranking up the volume of the television during the weather forecasts. Sometimes, even a non-action can have a highly communicative value and thus become a communicative action proper:

(4) Ann: I love you so much, Bob.

Bob remains silent and keeps eating his soup.

None of these actions or of their effects is reducible to purely material terms. Understanding an utterance is a matter of abduction: basically, it is a diagnostic process whereby we reconstruct a meaning starting from scarce and often ambiguous hints, and this process is a mental one. That it is grounded in the individual's interactions with the environment and with other individuals does neither make it less mental nor eliminate the need to consider the individual mind as the proper object of investigation of psychology.

In general, no list of behaviors with their contexts of occurrence may substitute for a mentalistic theory of the mental dynamics involved in their generation.

6.2.3 Communication as mindreading

Another interesting stream of research on communication, more mentalistically oriented than conversation analysis and studies of the common ground, substantially identifies communication and mindreading (for theoretical reasons, we prefer this neutral term to the more classical "Theory of mind"). This approach traces back to Grice's analysis of non-natural (that is, Intentional, or communicative) meaning [24].

Grice defines communication as an overt interaction between two (or more) agents, one meaning something by a certain action in a certain context and the other(s) inferring from the observation of that action to its presumed communicative meaning. Communicative meaning is the effect that the first agent overtly intends to achieve on the partner's mental processes.

Let us reconsider the episode outlined in (3) above: Ann says "It looks like it's going to rain", and Bob takes an umbrella with him while going out. In Grice's account, as spelled out by Strawson [25], this is a case of (successful) communication iff Ann, by her utterance, (i) intends to induce Bob to take an umbrella with him, (ii) intends Bob to recognize intention (i), (iii) intends such recognition to be (part of) Bob's reason for taking an umbrella with him, and Bob recognizes Ann's intentions (i – iii) in his turn.

When Grice wrote his seminal paper the expression "Theory of mind" [26] had not been invented yet, nor there existed a corresponding research area; yet, his account is fully compatible – or straightforwardly identifiable – with the idea that human communication is largely or exclusively based upon mindreading.

Several theories of communication are founded on this assumption (e.g., [27], at least as revised in [28]). In [29], for example, an agent's actions in dialogue result from the interaction of her cognitive dynamics (that is, basically, the mental states

that she entertains moment by moment) with those that she ascribes to her partner(s). A communicating agent's subjectively viewed situation (see Section 3) includes the partner's presumed mental states; her actions consist in speech acts. While it is impossible to know the details of each other's respective situation and mental states, agents must be able to understand at least an outline of them. Mindreading thus gains a crucial role in communication, the other key element of which is the capability to plan and produce speech acts so appropriately that the partner's mental states are modified as desired.

Some researchers are very critical of the notion of a Theory of mind: e.g., Gallagher [30] and Gallagher and Hutto [31] reject it on the basis of their phenomenological approach to intersubjectivity. This appears to also imply a rejection of the idea that human communication builds upon mindreading.

However sympathetic with these perspective and proposals, we do not feel that the notion of mindreading is completely devoid of usefulness [32], at least while it is not cast in classical cognitive or modular terms. We can imagine Bob wondering whether Ann actually wanted to suggest that he take an umbrella when going to work or that he do not water the flowers before going. In general, it is normal for humans to ask themselves and the others explicit questions about someone's "real" thoughts and feelings and to look for rational answers to them. We agree that mindreading heavily leaks into a narrative experience, but we do not think that narration and theorization should necessarily be antagonistic notions.

The real problem, as was the case with cooperation, is whether a theory of communication can be built upon mindreading. There can be no doubt that we sometimes recur to mindreading in communication (as there can be none that we often materially cooperate with our partners in the management of common ground during face-to-face interactions). However, it is hard to believe that, each time a colleague or a student of ours says "hello" upon meeting us in the corridor, we remain unable to understand the meaning of that utterance until we have reconstructed what that person's mental states might have been when she uttered it.

Another argument against the view that communication builds on mindreading comes from developmental considerations.

The discussion on the ontogenesis of mindreading has a long and articulated history that we will not attempt to summarize here (but see [32, 33]). However, most empirical data currently available agree that infants are incapable to read minds at least during their first 9-12 months of life. If mindreading were a necessary component of human communication, or of social cognition in general, infants younger than that would turn out to be incapable to communicate with their caregivers and to understand the communication that the caregivers address to them [34]. This is impossible, because this would prevent them from participating in the interpersonal dynamics that are necessary for their development as persons and as members of the human species and of their cultural community.

To divide the human capability of intersubjectivity into components or into logically, ontogenetically or phylogenetically successive phases [35, 36] does not help with this problem, because Grice's theory and its descendants identify communication with what is anyway the most evolved component of mindreading or the final phase of its development, that is the capacity to form explicitly beliefs about and to reason upon a partner's mental states.

Nor, for the reasons we have already discussed, would the problem be solved by grounding early communication into the material interactions that the infant has with the caregivers [37, 38, 39].

6.2.4 Sharedness in communication

In Grice's account [24], as outlined above, the brief episode in (3) is a true instance of (successful) communication if and only if Ann, by uttering that sentence, entertains a certain set of intentions (*i – iii*) regarding Bob's mental states and Bob entertains a matching set of beliefs regarding Ann's intentions.

However, this account lends itself to certain counterexamples (concerning in particular keyhole recognition) that can only be avoided if Ann also entertains an intention (*iv*) that her intention (*ii*) be recognized, an intention (*v*) that her intention (*iv*) be recognized, and so on, and if Bob entertains the corresponding set of beliefs [25, 40]. This leads into an infinite regression whereby, for any *n*-th intention that the agent entertains, it is always necessary that she also entertain an (*n + 1*)-th intention that that intention be recognized, and that the partner recognize all such intentions. This is obviously impossible for principled and practical reasons.

A solution to this problem has been proposed by Airenti, Bara and Colombetti [11], who define common knowledge as a primitive, circular mental state type which they call *shared belief*: an agent shares the belief that *p* with a partner if she believes that *p* and that the partner shares the belief that *p* with her. Communication (that is, conversational cooperation – see above) is a joint activity that takes place in the space that an agent shares with a partner.

So defined, shared belief is a mental state among the others [41]: it is subjective (that is, one-sided – no collective mind is required), primitive (that is, irreducible to private beliefs), and representational (that is, relative to the viewpoint of the agent who entertains it, and not to that of the partner's or to "objective truth"). An agent has neither the need nor the possibility to know what is "objectively" shared with a partner. Being ascriptional, shared belief does not require fancy abilities like telepathy or an endless circularity of reciprocal confirmations; nor does it require or allow any more reference to "objective" facts in the external world than ordinary beliefs do. It may happen that I take *p* to be shared with you, whereas you do not believe *p* or do not take *p* to be shared with me. The failure of a (supposedly) shared belief may give rise to different kinds of problems, exactly like the failure of a private belief, but does not create more cognitive or epistemological difficulties than it does.

Sharedness is in the agent's mind, not in the world. The meaning of a communicative action, and even its communicative nature, is therefore, from the standpoint of the addressee, a matter of ascription. That is, Bob may wrongly take Ann's behavior as communicative or vice versa, or as communicative that *q*, while Ann meant to communicate that *p*.

This account captures the overt and circular nature of communication in a psychologically plausible way. Sharedness is an agent's ability to construe her own mental states as mutually known to a partner. This is the starting point of communicative interaction, which may then be viewed as the progressive modification of the mental ground that each participant shares with the partner.

6.2.5 Communicative competence in the infant and the adult

The solution that we have advanced elsewhere [32, 33, 34] to the problem of infant communication is to employ a reformulation of Airenti, Bara and Colombetti's notion of shared belief to account for communication in the first months of life in such a way that children be viewed as fully human from the beginning, although apparently incapable of reading minds. Our proposal is to view communication as an innate competence, one component of which – namely, the ability to share – is present at birth, albeit in an early version, while another – namely, mindreading – appears at a later age. On our account, infant communication in the absence of mindreading is then possible if the child construes all of her mental states as shared with the caregivers.

This is in agreement with the empirical evidence that the infant is incapable of understanding that other individuals have mental states of their own that are qualitatively similar but not necessarily identical to those that she entertains. While the classical interpretation of these data is that she must therefore live alone in a subjective world of which she – in the better case – is the only inhabitant endowed with a mind, ours is that she lives instead in an ever-social world where everybody simply and directly knows her feelings and thoughts. In her perspective, all of her experiential states would be intrinsically public, that is, shared with the individuals that surround her.

An infant thus has no private, non-social mental states; to her, intersubjectivity and communication are a plain state of the world rather than a local, transient occurrence. This only requires a primitive recognition of agency, a capability that, according to the relevant literature, can be safely ascribed to infants not older than a few weeks [42, 43, 44, 45]. An elder child's or an adult's ability not to construe all of her mental states as shared is made possible by the later development of the capability to differentiate one's own mental states from those that may be ascribed to the partner. Mindreading then builds on the latter development.

The idea that sharedness is a primitive capability of the human mind has a certain amount of empirical support and contributes to founding a view of communication as a faculty, or competence, in its own respect [46]. It is crucial to note here that, on this account, this ability is a mental one. Sharedness is mental: like everything mental, it reflects in the individual's actions, but cannot be recovered from the empirical or material levels alone.

6.3 Human agency

An agent is a conscious organism who lives in a dynamic situation and strives to make it more to her liking; the situation is a subjective, open, and continually revised interpretation of the environment [29, 46].

An agent's mind consists in a flow of consciousness, that is, in a flow of subjective, meaningful representations. For our current purposes we, like other researchers [47, 48, 49], conceive of terms like *mind*, *consciousness*, *representation*, *semantics*, and *Intentionality* as synonymous. In the case of the human species, the mind consists in a flow of meaningful representations of the agent herself immersed in and interacting with her subjective environment as it is, was, or could be.

The agent's subjective situation is a dynamical landscape of meanings; meanings are opportunities for actions (*affordances*, in Gibson's terms [50, 51]). Representations neither need nor can be faithful to the real world. They are active constructions that the agent makes of an ultimately unknowable reality, by superimposing a subjective ontology [52] on it that may comprise different types of objects, relations, events, and actions. An agent's subjective ontology and the representations into which it is embedded just need be compatible with the external reality, whatever its ultimate nature may be. An agent's subjective ontology and representations result from its phylogenetic and ontogenetic history as well as from the reading that she makes of the current situation. That is, there is no *a priori* catalogue of discrete, pre-defined entities given once and for all and kept in a repository from which they are extracted and employed when needed; instead, the mind is continually re-created in the agent's here and now [53, 54].

More specifically, the human mind entertains some interesting properties. Our mental life is structured along two interwoven dimensions that may be called *experience* and *description*, or *narration* [55, 56]. Every experience of ours incorporates a description that rises from it and allows for its form, structure and sense and that results from a mix of (fragments of) logical, causal, and psychological explanations, retrograde reconstructions and anterograde projections, linguistic labeling and redescriptions, narrative integrations and so on. Actually, it is imprecise to say that experience and description are interwoven: they structure and determinate each other in a circular way, so much so that it is impossible to keep them separate, except for descriptive purposes. Phenomenically, they are one and the same thing.

The idea that human cognition is such a complex but unitary dynamics traces back in modern science at least to Michotte's demonstration that his subjects "directly" perceived causality even when there was none and incorporated it into their visual experience, to the point of being unable not to do so [57]. Causality thus becomes one of the crucial structural components of the subjective ontology of the human species and therefore of the world we perceive.¹

When we see or think of a car we cannot help sensing features to it that go beyond its mere visual appearance: under normal conditions, we can recognize it as an artificial object, namely a machinery of sort, we can assign a linguistic label to it, we know what it is for and how to use it, we have a sort of memory or bodily image of what it feels like to drive it or to travel in it, we have at least a rough idea of its material structure and monetary value, and so on. Our knowledge about the car is not distinct from our visual perception or imagery of it: like its shape or color, it is an ineliminable part of our perception of it. Exactly like we cannot possibly see the car with a shape different from what it appears to us, we cannot see it without recognizing it as a car, knowing that it is made for driving, and so on; and, exactly like its color or its shape, the knowledge that we have of it arises in and from the interaction that we have with it as well as with other encounters with or descriptions of cars that we may have faced in the past.

¹ In Michotte's experiments, subjects who were shown, for example, cartoons depicting couples of abstract forms moving could not help interpreting them in terms of, e.g., the triangle "pursuing" the square, who was "waiting for it" or "fleeing from it", and so on. In today's terms, what Michotte was exploring actually was the human perception of Intentional causation, that is mindreading.

Still more pervasively, our knowledge of cars modifies a whole range of activities and creates new ones. Our perception of what places can be reached within a certain time, how, and with how much effort, changes, and so do our representations of the territory within which we act or of our professional or social activities. Even our perception of the physical space that our body occupies changes when we drive.

In general, our knowledge of cars modifies our representation of the world and of ourselves in the world. Such modification is not supplementary to a supposedly "basic functioning" of our mind: there is no way I can divide my experience of driving into an experience of me-without-car, plus a car with no experiential connotations, plus a superordinate description of the whole business. There exists instead the complex experience of me-in-the-car-in-the-street involved in the complex activity of driving while narrating to myself what is happening, how, and why, and what has happened immediately before, and what is going to happen next and what I can do about it.

Actions are the external counterpart of these mental dynamics. When I meet a friend, I can rejoice, smile, and shake hands with him. This happens because I represent and narrate the whole situation in which I find myself as characterized by certain features, to which I react by forming certain emotions, desires and intentions. This leads me to engage in a social activity – in the end, what happens is that I walk toward my friend, smiling and offering him to shake hands.

An agent's cognitive dynamics across time thus results from the interaction of her mind/body with the subjective internal and the external environments. The specific patterns with which this happens are rooted in her phylogenetic and ontogenetic history, as well as in her current interests and feelings. What can be said in general terms is that they depend on the worldviews that the agent maintains. Worldviews are frameworks of interpretation that provide for the meaning that a certain situation and its current features have for a certain agent at a certain time.

For example, my intention to rise from this chair, go to the fridge and take a beer only makes sense because it is part of my current worldview that I am sitting, that I might use a beer, that there is one in the refrigerator, that the floor that lies between me and the refrigerator will sustain me while I walk, that I will be able to open the refrigerator and to recognize and grab the beer can, and so on.

An agent's engagement in an activity is sensibly understood only against the background provided by such worldviews [53, 54, 58]. Worldviews need not be fully represented for an agent to represent, narrate and engage in an activity; indeed, they typically are not. We usually do not even conceive of the possibility that the floor of our kitchen is not so solid as it seems; nonetheless, it is because we take it for granted that it is that we can engage in the beer-taking activity.

Still, as adult human beings we can always focus on some features of the worldviews in which we are currently engaged and possibly reason upon them or verbalize them: but this is a mental and social activity in itself, in which language and education (and, in general, ontogeny) play a key role, and is not necessarily part of the beer-taking activity. Indeed, most of the times we drink beer without feeling any need to verbalize the worldviews that underlie such activity – and,

even when we decide to do so, we can only focus on a small subset of the features of our worldviews.²

6.4 Communication

What, then, is communication in the human species, and what role does sharedness play in it?

There are, in our view, three such roles. Firstly, sharedness has to be part of the current worldview, that is, of the background within which we participate in communication, producing and interpreting the relevant actions. Secondly, it may be a mental state or part thereof, that is, something which is present to the agent's awareness and which the agent can reason upon and verbalize. Thirdly, it plays a manifest role in the artifacts that we can materially use to communicate.

Let us examine these roles in better detail. The first is that sharedness has to be part of the communicating agent's worldview. Our communicative acts take place within the framework provided by sharedness, without our being necessarily aware of it. When we engage in a casual conversation with a colleague in the elevator that is bringing us to our story, we do not focus on sharedness, but on the actual topic of conversation. Under normal conditions, we are not even aware that there is an issue of sharedness at play here. Yet, we speak Italian, even if the both of us also speak English and French, we use kind words and a gentle voice, we trade references to previous experiences we had together, we laugh about other colleagues, and so on – all feats that we accomplish without even realizing that they are possible and meaningful only because we take it for granted that our interlocutor and we share similar knowledge, memories, feelings, mental dynamics, etc.

Our partner does exactly the same. None has access to the other's mind, none is likely to really question the status of sharedness, and yet communication flows smoothly. And, of course, the same happens when we write a paper (although this is a much more troublesome activity) or a message to put in a bottle and launch into the wide ocean.

Sharedness is part of the worldview that we are adopting, and can thus provide the framework of interpretation within which the various communicative acts that we exchange acquire their meaning. However, it is not necessarily part of our conscious states, or even of our engagement in and representation and narration of that conversation.

Yet, we can always focus on sharedness and reason upon it or verbalize it, e.g., when we realize that a breakdown has occurred in conversation. When sharedness is actually present to our mind, that is when we become aware that our partner and we are moving or failing to move on a shared mental ground, then an analysis in terms of private and shared beliefs may be appropriate.

Analyses in terms of mental states have been standard practice in theoretical studies of communication for half a century, at least since Grice's paper [24] which we have repeatedly mentioned (see [46] for a discussion of the structure and

² Our notion of *worldviews* may resemble Searle's (1983) notion of *Background*. While we have no space to discuss the similarities and differences, we have opted for a different label because we think that there are certain difficulties inherent to Searle's Background which we do not want to inherit here. Our notion of worldviews is meant to stand on an autonomous ground.

import of mental states talk in this area). Interestingly, even areas traditionally as far removed from phenomenology or from a holistic conception of cognition as could be, like classical cognitive science and artificial intelligence, have found themselves in the need to adopt a BDI (Belief-Desire-Intention [59]) paradigm for the study of private and social action, including communication.

Communicative meanings are the material counterparts of sharedness, and this is the third role that such notion plays in our analysis.³ Independently of their material appearance, communicative meanings are virtual artifacts that are produced and function in the mental space that the interactants share. Thanks to the experience/description dynamics we have outlined, and to the capability of understanding and manipulating such dynamics, humans are capable to summarize their situations (whether actual or not, and even insincerely) into partial descriptions and then possibly to act so that, given the grounds provided by sharedness, the mental dynamics of other humans are properly modified. This is independent of whether it occurs with language, gestures, or even sheer silence, or of the time and space that may separate the interlocutors. Mindreading only enters the process when the partner happens to wonder what the actress's mental dynamics really were as she produced a certain communicative meaning.

A rewording of this idea might be as follows: communicative meanings are reifications of the actress's situation that are externalized in a form that may become public knowledge of all the parties involved. When everything works, such public knowledge interferes with the mental dynamics of the partner(s), modifying them in the direction that the actress desired.

Communication thus takes place when an actress overtly tries to interfere with some other agent's situation. "Overtly" means that a partial comprehension of the actress's situation is intentionally shown to the partners and thus made part of their situation. With communication, part of each agent's situation is subject to the others' scrutiny and partial control. This is only possible in a species whose members are capable (*i*) of sharedness in the different forms we have outlined, and (*ii*) of externalizing a description of appropriately chosen features of their situation. Communicative meanings are partial (and not necessarily sincere) descriptions of the actress's mental dynamics, overtly reified and externalized so that the partners' mental dynamics are modified. The partner may or may not materially cooperate with this operation: in face-to-face conversations this typically (but not necessarily) happens, but in other situations it does not – yet communication takes place and can be successful in the latter case as well as in the former.

During this activity, the public knowledge at play and the peculiar nature of the human mind allow the participants to "zoom in" and "out" on their respective mental states and worldviews (as well as, of course, on the actual topics of communication). Thus emerges the "choreographic" nature of communication. Such choreography, however, is seldom planned as such; rather, it emerges from the relative commonality and predictability of the participants' respective mental dynamics, as well as from social customs and conventions.

³ We have already argued that "material", in this context, may have a peculiar meaning — see the example in (4) and the relevant discussion.

6.5 Acknowledgments

Research and scholarly activities for this paper were funded by the Fondazione Cassa di Risparmio di Torino (CRT). We are grateful to Francesca Morganti for her endless patience and, together with Antonella Carassa, Livia Colle and Marianna Vallana, for several discussions about the topics dealt with herein.

6.6 References

- [1] C.E. Shannon & W. Weaver, *The mathematical theory of communication*. Urbana, IL: University of Illinois Press, 1949.
- [2] L. Wittgenstein, *Philosophische Untersuchungen (Philosophical investigations)*. Oxford: Blackwell, 1953
- [3] H.P. Grice, *Studies in the way of words*. Cambridge, MA, and London: Harvard University Press, 1989.
- [4] J.L. Austin, *How to do things with words*. London: Oxford University Press, 1962 (2nd ed. revised by J.O. Ormson & M. Sbisà, 1975).
- [5] J.R. Searle, *Speech acts: An essay in the philosophy of language*. London: Cambridge University Press, 1969.
- [6] J.R. Searle, *Expression and meaning*. Cambridge: Cambridge University Press, 1979.
- [7] H.P. Grice, Logic and conversation. In P. Cole & J.L. Morgan (Eds.), *Syntax and semantics*, vol. 3: *Speech acts*, New York: Academic Press, 1975.
- [8] P.R. Cohen & C.R. Perrault, Elements of a plan-based theory of speech acts. *Cognitive Science*, 3, 177-212, 1979.
- [9] J.F. Allen & C.R. Perrault, Analyzing intention in utterances. *Artificial Intelligence*, 15, 143-178, 1980.
- [10] P.R. Cohen, J. Morgan & M.E. Pollack (Eds.), *Intentions in communication*. Cambridge, MA: MIT Press, 1990.
- [11] G. Airenti, B.G. Bara & M. Colombetti, Conversation and behavior games in the pragmatics of dialogue. *Cognitive Science*, 17, 197-256, 1993.
- [12] H. Sacks, E.A. Schegloff & G. Jefferson, A simplest systematics for the organization of turn-taking in conversation. *Language*, 50, 696-735, 1974.
- [13] E.A. Schegloff, G. Jefferson & H. Sacks, The preference for self-correction in the organization of repair in conversation. *Language*, 53, 361-382, 1977.
- [14] E.A. Schegloff, The relevance of repair to syntax-for-conversation. In T. Givon (Ed.), *Syntax and semantics 12: Discourse and syntax*. New York: Academic Press, 1979.
- [15] E.A. Schegloff, Repair after next turn: The last structurally provided defense of intersubjectivity in conversation. *American Journal of Sociology*, 97, 1295-1345, 1992.
- [16] H.H. Clark & D. Wilkes-Gibbs, Referring as a collaborative process. *Cognition*, 22, 1-39, 1986.
- [17] H.H. Clark & Schaefer, E.F. (1989) Contributing to discourse. *Cognitive Science*, 13, 259-294, 1989.
- [18] H.H. Clark, *Arenas of language use*. Chicago, IL: University of Chicago Press, 1992.
- [19] H.H. Clark, *Using language*. Cambridge: Cambridge University Press, 1996.
- [20] M. Tomasello, *The cultural origins of human cognition*. Cambridge, MA & London: Harvard University Press, 1999.
- [21] M. Tomasello & H. Rakoczy, What makes human cognition unique? From individual to shared to collective intentionality. *Mind and Language*, 18, 121-147, 2003.
- [22] I. Brinck & Gärdenfors, Co-operation and communication in apes and humans. *Mind and Language*, 18, 484-501, 2003.
- [23] I. Brinck, The role of intersubjectivity for intentional communication. In T. Racine, C. Sinha, J. Zlatev & E. Itkonen (Eds.), *The shared mind: Perspectives on intersubjectivity*. Amsterdam: Benjamins, in press.
- [24] H.P. Grice, Meaning. *The Philosophical Review*, 67, 377-388, 1957.
- [25] P.F. Strawson, Intention and convention in speech acts. *The Philosophical Review*, 73, 439-460, 1964.
- [26] D. Premack & G. Woodruff, Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, 1, 512-526, 1978.
- [27] D. Sperber & D. Wilson, *Relevance. Communication and cognition*. Oxford: Blackwell, 1986.

- [28] D. Wilson & D. Sperber, Pragmatics and modularity. In S. Davis (Ed.), *Pragmatics. A reader*. Oxford: Oxford University Press, 1991.
- [29] M. Tirassa, Mental states in communication. *Proceedings of the 2nd European Conference on Cognitive Science (ECCS '97)*. Manchester, UK, 1997.
- [30] S. Gallagher, The practice of mind: Theory, simulation, or interaction? *Journal of Consciousness Studies*, 5-7, 83-108, 2001.
- [31] S. Gallagher & D. Hutto, Understanding others through primary interaction and narrative. In T. Racine, C. Sinha, J. Zlatev & E. Itkonen (Eds.), *The shared mind: Perspectives on intersubjectivity*. Amsterdam: Benjamins, in press.
- [32] M. Tirassa, F.M. Bosco & L. Colle, Rethinking the ontogeny of mindreading. *Consciousness and Cognition*, 15, 197-217, 2006.
- [33] M. Tirassa, F.M. Bosco & L. Colle, Sharedness and privateness in human early social life. *Cognitive Systems Research*, 7, 128-139, 2006.
- [34] F.M. Bosco & M. Tirassa, Sharedness as an innate basis for communication in the infant. *Proceedings of the 20th Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Erlbaum, 1998.
- [35] S. Baron-Cohen, *Mindblindness*. Cambridge, MA: MIT Press, 1995.
- [36] P. Gärdenfors, Evolutionary and developmental aspects of intersubjectivity. In H. Liljenström & P. Århem (Eds.), *Consciousness transitions: Phylogenetic, ontogenetic and physiological aspects*. Amsterdam: Elsevier, in press.
- [37] J.S. Bruner, Formats of language acquisition. *American Journal of Semiotics*, 1, 1-16, 1982.
- [38] G. Airenti, Dialogue in a developmental perspective. *Proceedings of the 6th Conference of the International Association for Dialogue Analysis*. Tübingen: Niemeyer, 1998.
- [39] G. Airenti, The development of the speaker's meaning. In C. Florén Serrano, C. Inchaurrealde Besga, M.A. Ruiz Moneva (Eds.), *Applied linguistics perspectives: Language learning and specialized discourse*. Zaragoza: Anubar, 2004.
- [40] S.R. Schiffer, *Meaning*. Oxford: Oxford University Press, 1972.
- [41] B.G. Bara & M. Tirassa, A mentalist framework for linguistic and extralinguistic communication. *Proceedings of the 3rd European Conference on Cognitive Science*. Roma: Istituto di Psicologia del Consiglio Nazionale delle Ricerche, 1999.
- [42] C. Trevarthen, Descriptive analyses of infant communicative behavior. In H. Schaffer (Ed.), *Determinants of infant behavior*. London: Academic Press, 1977.
- [43] L. Murray & C. Trevarthen, Emotional regulation of interaction between two-month-olds and their mothers. In T.M. Field & N.A. Fox (Eds.), *Social perception in infant*. Norwood, NJ: Ablex, 1985.
- [44] A.M. Leslie, ToMM, ToBy, and Agency: core architecture and domain specificity. In L.A. Hirschfeld & S.A. Gelman (Eds.), *Mapping the mind. Domain specificity in cognition and culture*. Cambridge: Cambridge University Press, 1994.
- [45] D. Premack, The infant's theory of self-propelled objects. *Cognition*, 36, 1-16, 1990.
- [46] M. Tirassa, Communicative competence and the architecture of the mind/brain. *Brain and Language*, 68, 419-441, 1999.
- [47] J.R. Searle, *The rediscovery of the mind*. Cambridge, MA: MIT Press, 1992.
- [48] F. Varela, A science of consciousness as if experience mattered. In S.R. Hameroff, A.W. Kaszniak & A.C. Scott (Eds.), *Toward a science of consciousness: The first Tucson discussions and debates*. Cambridge, MA: MIT Press.
- [49] F. Varela, E. Thompson & E. Rosch, *The embodied mind. Cognitive science and human experience*. Cambridge, MA: MIT Press, 1991.
- [50] J.J. Gibson, The theory of affordances. In R.E. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing*. Hillsdale, NJ: Erlbaum, 1977.
- [51] J.J. Gibson, *The ecological approach to visual perception*. Boston, MA: Houghton Mifflin, 1979.
- [52] M. Tirassa, A. Carassa & G. Geminiani, A theoretical framework for the study of spatial cognition. In S. Ó Nualláin (Ed.), *Spatial cognition. Foundations and applications*. Amsterdam and Philadelphia: Benjamins, 2000.
- [53] A. Carassa, F. Morganti & M. Tirassa, Movement, action, and situation: Presence in virtual environments. *Proceedings of the 7th Annual International Workshop on Presence*. Valencia, Spain: Editorial Universidad Politécnica de Valencia, 2004.
- [54] A. Carassa, F. Morganti & M. Tirassa, A situated cognition perspective on presence. *Proceedings of the 27th Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Erlbaum, 2005.
- [55] V.F. Guidano, *Complexity of the Self: A developmental approach to psychopathology and therapy*. New York: Guilford, 1987.

- [56] V.F. Guidano, *The Self in process. Toward a post-rationalist cognitive therapy*. New York: Guilford, 1991.
- [57] A. Michotte, *La perception de la causalité*. Louvain: Éditions de l'Institute Supérieur de Philosophie, 1946.
- [58] W.J. Clancey, The conceptual nature of knowledge, situations and activity. In P.J. Feltovich, K.M. Ford & R.R. Hoffmann (Eds.), *Expertise in context*. Cambridge, MA: AAAI Press/MIT Press, 1997.
- [59] A. Rao & M. Georgeff, An abstract architecture for rational agents. *Proceedings of KR 92: The 3rd International Conference on Knowledge Representation and Reasoning*. San Mateo, CA: Morgan Kaufmann, 1992.