

Maurizio Tirassa

The Torino Inter-University Center for Cognitive Science

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Research at the CSC

Work at the Torino Inter-University Center for Cognitive Science (henceforth, CSC) reflects the complexities of today's cognitive science. The very history of the Center testifies to the changes which the area is undergoing in these years. The CSC was established in 1992 as a joint initiative of the Department of Psychology of the University of Torino, the Department of Computer Science of the same university, and the Department of Control and Computer Engineering of the Polytechnic of Torino. More recently, the Department of Biology of the University of Torino and the Department of Philosophy of the Amedeo Avogadro University of Eastern Piedmont joined the endeavour. Thus, the CSC has traversed the whole recent history of the cognitive sciences, from the classical information-processing approach to the opening to biology—particularly, of course, neuropsychology and the neurosciences in general as well as evolutionary and evo/devo biology.

The main research areas of the CSC are:

- action and communication in human beings and in AI systems,
- ontogeny and impairments of human action and communication,
- mindreading, collective intentionality and social cognition,
- reasoning and decision making,
- metacognition,
- theoretical psychology and foundations of the cognitive sciences,
- neuropsychology,
- artificial intelligence,
- philosophy,

- psychopathology and clinical psychology,
- learning and education, and
- computer science.

Because of the width of these interests, and of the range of theoretical and empirical strategies with which they are fostered, it would be impossible to provide a thorough description of the research carried on in each of these areas. Therefore, only a few hints will be given. The comprehensive list of references provided in the [Appendix](#) will hopefully give a more detailed picture of what has been done at the CSC during these years.

Further information, including the complete list of the affiliates with their physical and digital addresses, as well as other personal and collective information, can be found on the CSC web site at < <http://www.psych.unito.it/csc> > .

Theories of communication and social cognition

Communication is a major research area of the CSC. Theoretical and experimental studies in this area focus on the nature, the development, and the decay of this crucial human competence.

Theoretical research has focused in particular on the mental processes involved in communication and dialogue. Such processes are generally described as sequences of mental states, that is in terms of what are called belief–desire–intention (BDI) architectures.

While, historically, this has allowed the various philosophical perspectives that can be taken on the mind and on communication (whether computational, biologically inspired, and even reductionist) to use a common jargon and thus to cross-fertilize, much still remains to be understood as to what precisely these terms mean, and as to whether their meaning is the same in all these different perspectives. Similar considerations hold for the particular dynamics with which the various mental states postulated to take part in dialogue follow each other.

Thus, working on communication has led several researchers to also engage in the current debate on the nature of representations and, in general, on the foundations of the cognitive sciences (see below).

Most researchers at the CSC would agree on a view of communication as a process of cooperative meaning-making between the interactants. Cooperation is only possible on the background provided by the knowledge that the interactants have of each other and of the common (shared) ground on which they are moving. Suitable theories of what sharedness is, when and how it may be taken for granted prior to communication or reached during (and via) dialogue, and of the phylogeny and ontogeny of the capability for sharedness in the human species, have therefore had to be proposed.

Further work on the structure and functioning of social interactions

Mindreading

These views of communication and cooperation have also required gaining an understanding of the ability to “read into” a partner’s mind. This, commonly known as *mindreading* or *Theory of Mind*, is therefore a related focus of research at the CSC.

In an AI perspective, this amounts to a theory of how the interlocutor (often, the human user of a computer interface) can be modelled in computational terms. This consists in a sort of nesting of BDI architectures within each other; or in the system’s capability to explicitly or implicitly reason upon (a specific token of) such architecture.

In a psychological perspective, mindreading has instead been mostly (but not exclusively) investigated in a developmental perspective, both because this is an interesting strategy in itself and because mindreading in the (non-impaired) adult is a highly sophisticated and culture-laden activity.

It is also interesting to remark that a failed ontogeny or a later breakdown in the capability of mindreading has been viewed as (part of) what causes the symptomatology of at least two diseases of neuropsychological interest, namely autism and schizophrenia. These pathologies have also been investigated by researchers working at the CSC.

Communicative actions

The mental activities involved in communication find their visible counterpart in the actions that are actually performed. Therefore, studies of linguistic and extralinguistic dialogue acts (including their theoretical, cerebral and pragmatic differences, their patterns of development and decay, and so on) are still another focus of research in this area.

This has mostly been accomplished by researchers belonging to artificial intelligence. In this area, AI research at the CSC includes the computational modelling of cognitive agents and of their interaction at different levels.

Computational studies of language have focused on syntactic analysis and robust methods for NLP and the development of linguistic resources and software systems and resources for the Italian language (in particular two parsers based on dependency theory and the TUT—Turin University Treebank).

Other AI studies of agent interaction

Beside what has been already said, AI studies of agent interaction have also focused on modelling cooperative versus non-cooperative contexts and of the relevant differences in obligation management, decision making, and planning.

Still another direction of research has been the investigation of the general features of social interaction between simple rational agents in a closed world, such as the stock market and other legal and economical contexts.

Empirical studies of communication

Finally, different approaches to communication will lead to different theories of how such highly complex competence and its “components” (such as the abilities of reading into the mind of partners, sharing mental states with them, planning appropriate communicate moves, understanding the partners’ moves, and so on) develop in children and of how they may decay following different types of neuropsychologically relevant brain diseases.

Empirical studies of communication have focused, besides the more traditional psychological experimentation (in terms, for example, of story understanding, thinking-aloud protocols, and so on), on neuroscientific and neuropsychological approaches. Knowledge so collected may help to revise the overarching theories, of course, but it also has a clinical value in itself.

Neuroscientific studies of communication have focused on the decay of communicative skills after cerebral damage; furthermore, we have devised studies of normal subjects with neuroimaging techniques.

Impairments of communication can be found in a wide range of diseases, including cerebrovascular diseases (stroke) of either the left or the right hemisphere (albeit with different consequences on communication), head trauma, schizophrenia, Alzheimer’s disease, and other types of dementia; furthermore, several childhood diseases of neuropsychological interest may also yield abnormalities of communication, including autism and related syndromes, deafness, and traumatic brain injuries.

A major aim here has been to understand what specific disturbances of communication may occur in each specific disease (trivially, an impairment in planning, as it often occurs after head trauma, will have a different impact on the dialogue between the affected persons and their partners than an impairment of language, as it often occurs after stroke); this may help the clinician in understanding the symptomatology of different diseases as well as, as said above, help the theoretician in return to better understand the different components of communicative competence.

A further aim has been to collect the specific profiles of communication malfunctions in the various diseases and assemble them within a larger picture that can then be used to design specific assessment tests and strategies for the rehabilitation of communicative deficits.

Thinking and reasoning

Another major stream of research at CSC has been on thinking and reasoning. This includes studies of deduction, induction, and learning. Beside providing the core of our capabilities for formal reasoning, these kinds of inferential activities are constantly entangled in other everyday activities like understanding situations, formulating hypotheses, solving problems, or making decisions.

A first aim of this area is to develop unitary theories of the cognitive processes involved in different types of deductive reasoning. The assumptions underlying are that humans build representations of reality as mental models and that the construction and manipulation of models is driven by a mixture of general (context-free) and local (task-driven) strategies. The same research strategy has been applied to induction, generalization, and categorization. The work on deduction has yielded a computational model which simulates the performance of human subjects at syllogistic reasoning tasks.

Research on deductive and inductive reasoning has also been applied to the domain of education, and particularly to human learning and teaching. The aim here is to provide valid theoretical and empirical criteria for effective educational planning, where both contents and methods are related to the student's competences and resources.

An additional area is the investigation of how psychological techniques and multimedia technologies may help to improve learning and education.

Neuropsychology

Apart from what has been said about the study of impairments in communication, other research in neuropsychology at the CSC has been based on the use of neuroimaging (mostly fMRI—functional magnetic resonance imaging) techniques.

Functional magnetic resonance imaging studies are conducted at the Ospedale Koelliker of Turin as well as in collaboration with several research centres in Europe. Such studies are aimed at the assessment and rehabilitation of motor and cognitive diseases due to cerebral pathologies.

Examples of research projects in this area are the study of how the areas involved in movement execution and control may reorganize in patients with central paresis; the construction of fMRI protocols for the early evaluation of fronto-temporal dementia; and the study of the brain areas and centres involved in shared intentionality and other manifestations of social cognition.

Psychopathology

Exchanges and cross-fertilization between cognitive science and clinical psychology have lately become another focus of interest at the CSC; indeed, many of us perceive this as a major area of future development. Clinical psychology offers an interesting test bed for the validation or falsification of theories and results from within cognitive science; even more important, it can provide a crucial field of application.

Research conducted at the CSC within this area has included studies of the development and the evolution of the self, of attachment and its dysfunctions, of metacognition and mindreading. Studies of how to assess the effectiveness of psychotherapy have also been conducted.

The development of the self has been studied by focusing on the representations that individuals have of their attachment relation with their caregivers. The latter, of course, is most typically their father and mother; a more thorough consideration of the former than used to be in the past is a recent acquisition of clinical psychology.

The evaluation of psychotherapy has been conducted by studying the joint relation-building and meaning-making activities in which the psychologist and the patient/client are together involved. The underlying consideration is that psychotherapy consists mainly in knowledge- and interaction-based social practice, which means that the mental activities that are involved in other forms of communication play a crucial role in this process as well, together, of course, with specific clinical knowledge.

Mindreading and “metacognition” in general are also heavily involved in psychotherapy and related processes and activities, including the self-reflection in which the patient typically indulges both within, outside, before and after the specific psychotherapeutic setting.

These mental activities, which were more typically studied in laboratory settings, are often dysfunctional in cognitive and emotional disturbances, and are an important part of the patient's mental processes on

which a psychotherapist will focus. Since the classical laboratory tests of mindreading are too oversimplified to yield interesting results in this context, we have devised new and different methods for the investigation of metacognition and mindreading.

Foundations of cognitive science

Cognitive science has lately undergone a process of epistemological fragmentation into different, and possibly mutually exclusive, paradigms.

The old-fashioned information-processing or computational paradigm is still the most sound and complete approach to the study of the mind, and most researchers still subscribe to it, at least for want of a better one.

Yet, many others reject it; the grounds on which this happens, and the alternatives that are envisaged in its place, may lead to the development of different, sometimes radically so, paradigms.

All researchers take part in this debate, if only with their ontological, epistemological, and methodological choices; some, of course, make explicit attempts at developing, unfolding, and discussing landscapes within which to frame the study of the mind.

Researchers at the CSC make no exception. Thus, while most of them subscribe to one version or another of the classical cognitivist paradigm, others reject it in favour of some alternative. Among the various possibilities, those that have been most widely pursued are situated cognition (that is the idea that the mind only exists in the here-and-now of its conscious interactions with the world or, better still, with itself-in-the-world) and the loose version of anti-Cartesianism which is implicit in neuropsychological research; still others researchers work at some interaction between them.

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Appendix

Adenzato M, Ardito RB (1999) The role of theory of mind and deontic reasoning in the evolution of deception. In: 21st conference of the Cognitive Science Society, 19–21 August 1999, Vancouver, Canada

Adenzato M, Ardito RB, Izard E (2006) Impact of maternal directiveness and overprotectiveness on the personality development of a sample of individuals with acquired blindness. *Soc Behav Pers* 34:17–26

Adenzato M, Bara BG (2000) Deceiving: implications for primates. *Folia Primatol* 71:284

Airenti G (1998) Dialogue in a developmental perspective. In: *Dialoganalyse VI, Teil 1*. Max Niemeyer Verlag, Tübingen

Airenti G (1999) Rational action and communication: differences in development. In: 3rd European conference on cognitive science, 27–30 October 1999, Siena, Italy

Airenti G (2004) The development of the speaker's meaning. In: Florén Serrano C, Inchaurrealde Besga C, Ruiz Moneva MA (eds) *Applied linguistics perspectives: language learning and specialized discourse*. Anubar, Zaragoza

Airenti G (2005) The development of communicative background: nonverbal interactions and speech acts. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy

Airenti G, Bara BG, Colombetti M (1993) Conversation and behavior games in the pragmatics of dialogue. *Cogn Sci* 17:197–256

Airenti G, Bara BG, Colombetti M (1993) Failures, exploitations and deceptions in communication. *J Pragmatics* 20:303–326

Adenzato M, Becchio C, Bertone C, Tuomela R (2005) Neural correlates underlying action–intention and aim–intention. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy

Adenzato M, Garbarini F (2006) The As If in cognitive science, neuroscience and anthropology: a journey among robots, blacksmiths, and neurons. *Theor Psychol* (in press)

Ardissono L, Boella G, Damiano R (1998) A plan-based model of misunderstandings in cooperative dialogue. *Int J Hum Comput Stud* 48:649–679

Ardissono L, Boella G, Lesmo L (1995) Indirect speech acts and politeness: a computational approach. In: 17th conference of the Cognitive Science Society, July 12–15, Pittsburgh, PA

Ardissono L, Boella G, Lesmo L (2000) A plan-based agent architecture for interpreting natural language dialogue. *Int J Hum Comput Stud* 52:583–636

Ardito RB (2001) Dreaming as an active construction of meaning. In: Harnard S, Pace-Schott E, Blagrove M, Solms M (eds) *Sleep and dreaming: scientific advances and reconsiderations*. Cambridge University Press, Cambridge, UK

Ardito RB, Adenzato M, Dell'Osbell G, Izard E, Veglia F (2004) Attachment representations in adults with congenital blindness: association with maternal interactive behaviors during childhood. *Psychol Rep* 95:263–274

Ardito RB, Bara BG, Blanzieri E (2002) A cognitive account of situated communication. In: 24th conference of the Cognitive Science Society, 1–4 August 2002, Edinburgh, Scotland

Arlati E, Bottelli V, Fogh C, Tirassa M (1995) Modelling process knowledge in architectural design: a case-based approach. In: 8th international conference on systems research, informatics and cybernetics, 16–20 August 1995, Baden-Baden, Germany

- Baldoni M, Boella G, van der Torre L (2006) Roles as a coordination construct: introducing PowerJava. *Electronic Notes in Theoretical Computer Science* 150
- Bara BG (1993) For a developmental theory of mental models. *Behav Brain Sci* 16:336
- Bara BG (1994) Developing induction. *Int Stud Philos Sci* 8:31–34
- Bara BG (1995) Cognitive science: a developmental approach to the simulation of the mind. Lawrence Erlbaum Associates, Hillsdale, NJ
- Bara BG, Barsalou L, Bucciarelli M (eds) (2005) Proceedings of the 27th conference of the Cognitive Science Society. Erlbaum, Mahwah, NJ
- Bara BG, Bosco FM, Bucciarelli M (1999) Developmental pragmatics in normal and abnormal children. *Brain Lang* 68:507–528
- Bara BG, Bosco FM, Bucciarelli M (1999) Simple and complex speech acts: what makes the difference within a developmental perspective. In: 21st conference of the Cognitive Science Society, 19–21 August 1999, Vancouver, Canada
- Bara BG, Bucciarelli M (1997) The reason we reason. *Curr Psychol Cogn* 16: 63–69
- Bara BG, Bucciarelli M (1998) Language in context: the emergence of pragmatic competence. In: Quelhas AC, Pereira F (eds) *Cognition in context*. Instituto Superior de Psicologia Aplicada, Lisboa
- Bara BG, Bucciarelli M (2000) Deduction and induction: reasoning through mental models. *Mind Soc* 1:95–108
- Bara BG, Bucciarelli M, Colle L (1999) Pragmatic competence in autism. In: 3rd European conference on cognitive science, 27–30 October 1999, Siena, Italy
- Bara BG, Bucciarelli M, Colle L (2001) Communicative abilities in autism: evidence for attentional deficits. *Brain Lang* 77:216–240
- Bara BG, Bucciarelli M, Geminiani G (2000) Development and decay of extra-linguistic communication. *Brain Cogn* 43:1–3
- Bara BG, Bucciarelli M, Johnson-Laird PN (1995) The development of syllogistic reasoning. *Am J Psychol* 108:157–193
- Bara BG, Bucciarelli M, Johnson-Laird PN, Lombardo V (1994) Mental models in propositional reasoning. In: 16th conference of the Cognitive Science Society
- Bara BG, Bucciarelli M, Lombardo V (1998) Development and change in the ability to reason. In: 11th annual conference of the European society for cognitive psychology. Jerusalem, Israel
- Bara BG, Bucciarelli M, Lombardo V (2000) In favour of a unified model of deductive reasoning. In: García-Madruga J, Carriedo N, González-Labra MJ (eds) *Mental models in reasoning*. UNED, Madrid
- Bara BG, Bucciarelli M, Lombardo V (2001) Model theory of deduction: a unified computational approach. *Cogn Sci* 25:839–901
- Bara BG, Cutica I, Tirassa M (2001) Neuropragmatics: extralinguistic communication after closed head injury. *Brain Lang* 77:72–94
- Bara BG, Tirassa M (1999) A mentalist framework for linguistic and extralinguistic communication. In: 3rd European conference on cognitive science, 27–30 October 1999, Siena, Italy
- Bara BG, Tirassa M (2000) Neuropragmatics: brain and communication. *Brain Lang* 71:10–14
- Bara BG, Tirassa M, Zettin M (1997) Neuropragmatics: neuropsychological constraints on formal theories of dialogue. *Brain Lang* 59:7–49
- Barbero C, Lombardo V (1995) dependency graphs in natural language processing. *Lect Notes Artif Intell* 992:115–126
- Barbero C, Lombardo V (1997) Wide-coverage lexicalized grammars. *Lect Notes Artif Intell* 1321:60–71
- Becchio C, Adenzato M, Bara BG (2006) How the brain understands intention: different neural circuits identify the componential features of motor and prior intentions. *Conscious Cogn* (in press)
- Becchio C, Bertone C (2003) Neural bases of We-ness. In: 5th European conference on cognitive science, 10–13 September 2003, Osnabruck, Germany
- Becchio C, Bertone C (2003) Object temporal connotation. *Brain Cogn* 52:192–196
- Becchio C, Bertone C (2004) Wittgenstein running: neural mechanisms of collective intentionality and we-mode. *Conscious Cogn* 13:123–133
- Becchio C, Bertone C (2005) Beyond Cartesian subjectivism: neural correlates of shared intentionality. *J Conscious Stud* 12:20–30
- Becchio C, Bertone C (2005) The ontology of neglect. *Conscious Cogn* 14:483–494
- Beltratti A, Margarita S, Terna P (1996) Neural networks for economic and financial modelling. ITCF, London
- Blanzieri E, Bucciarelli M (1996) The evaluation of the communicative effect. In: 18th conference of the Cognitive Science Society, San Diego, CA
- Blanzieri E, Bucciarelli M, Peretti P (1996) Sentences and mental states in attributing intentions: modeling their cognitive balance. In: 1st European workshop on cognitive modeling, Berlin, Germany
- Boella G, Damiano R, Lesmo L (1999) Mental models and pragmatics: the case of presuppositions. In: 21st conference of the Cognitive Science Society, 19–21 August 1999, Vancouver, Canada
- Boella G, Hulstijn J, van der Torre L (2006) Interaction in normative multi-agent systems. *Electron Notes Theor Comput Sci* (in press)
- Boella G, Lesmo L (2002) A game theoretic approach to norms. *Cogn Sci Q* 2:492–512
- Boella G, Lesmo L (2002) Mental models theory and anaphora. In: 24th conference of the Cognitive Science Society, Fairfax, VA
- Boella G, Lesmo L, Damiano R (2005) On the ontological status of norms. In: Bejamins R, Casanovas M, Breuker J, Gangemi A (eds) *Law and the semantic web*. Springer, Berlin Heidelberg New York

- Boella G, Lesmo L, Damiano R (2006) On the ontological status of plans and norms. *Artif Intell Law J* (in press)
- Boella G, van der Torre L (2005) From the theory of mind to the construction of social reality. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy
- Boella G, van der Torre L (2006) A game theoretic approach to contracts in multiagent systems. *IEEE Trans Syst Man Cybern* (in press)
- Boella G, van der Torre L (2006) Security policies for sharing knowledge in virtual communities. *IEEE Trans Syst Man Cybern* (in press)
- Bosco C, Lombardo V (2003) A relation-based schema for treebank annotation. *Lect Notes Artif Intell* 2829:462–473
- Bosco FM (2005) Cognitive pragmatics. In: Brown K (eds) *Encyclopedia of language and linguistics*, 2nd edn. Elsevier, Oxford
- Bosco FM, Bucciarelli M, Bara BG (2003) Literal meaning and context categories in the attribution of communicative intentions: a developmental study. In: 26th conference of the Cognitive Science Society, 31 July–2 August 2003, Boston, MA
- Bosco FM, Bucciarelli M, Bara BG (2004) Context categories in understanding communicative intentions. *J Pragmatics* 36:467–488
- Bosco FM, Bucciarelli M, Bara BG (2004) The fundamental context categories in understanding communicative intention. *J Pragmatics* 36:467–488
- Bosco FM, Bucciarelli M, Bara BG (2006) Recognition and recovery of communicative failures in children. *J Pragmatics* (in press)
- Bosco FM, Friedman O, Leslie A (2006) Recognition of pretend and real actions in play by one- and two-year-olds: early success and why they fail. *Cogn Dev* (in press)
- Bosco FM, Sacco K, Colle L, Angeleri R, Enrici I, Bo G, Bara BG (2004) Simple and complex extralinguistic communicative acts. In: 26th conference of the Cognitive Science Society, 5–7 August 2004, Chicago, IL
- Bosco FM, Tirassa M (1998) Sharedness as an innate basis for communication in the infant. In: 20th conference of the Cognitive Science Society, 1–4 August 1998, Madison, WI
- Bosco FM, Vallana M, Colle L, Angeleri R, Sacco K (2005) Executive function, theory of mind and mental representations in explaining the communicative deficit in schizophrenic patients. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy
- Bucciarelli M (2000) Reasoning by categories in the Wason selection task. *Psychology* 11
- Bucciarelli M (2000) Reasoning strategies in syllogisms: evidence for performance errors along with computational limitations. *Behav Brain Sci* 23:669–670
- Bucciarelli M (2005) Pointing and related communicative meanings. *Curr Anthropol* 46:152–153
- Bucciarelli M (2006) How the construction of mental models improves learning. *Mind Soc* (in press)
- Bucciarelli M, Colle L, Bara BG (2003) How children comprehend speech acts and communicative gestures. *J Pragmatics* 35:207–241
- Bucciarelli M, Johnson-Laird PN (1999) Strategies in syllogistic reasoning. *Cogn Sci* 23:247–303
- Bucciarelli M, Johnson-Laird PN (2000) Is there an innate module for deontic reasoning? In: García-Madruga J, Carriedo N, González-Labra MJ (eds) *Mental models in reasoning*. UNED, Madrid
- Bucciarelli M, Johnson-Laird PN (2001) Falsification and the role of the theory of mind in the reduced array selection task. *Curr Psychol Lett: Behav Brain Cogn* 4:7–22
- Bucciarelli M, Johnson-Laird PN (2005) Naïve deontics: a theory of meaning, representation, and reasoning. *Cogn Psychol* 50:159–193
- Carassa A, Morganti F, Tirassa M (2004) Movement, action, and situation: presence in virtual environments. In: 7th annual international workshop on presence, 13–15 October 2004, Valencia, Spain
- Carassa A, Morganti F, Tirassa M (2005) A situated cognition perspective on presence. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy
- Carassa A, Tirassa M (1994) Representational redescription and cognitive architectures. *Behav Brain Sci* 17:711–712
- Colle L, Baron-Cohen S, Hill J (2006) Do children with autism have theory of mind? A non-verbal test of autism vs. specific language impairment. *J Autism Dev Disord* (in press)
- Colle L, Becchio C (2005) Intentional action understanding and sharing intentionality in children with autism. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy
- Costa F, Frasconi P, Lombardo V, Soda G (2003) Towards incremental parsing of natural language using recursive neural networks. *Appl Intell* 19:9–25
- Costa F, Frasconi P, Lombardo V, Sturt P, Soda G (2002) Enhancing first-pass attachment prediction. In: 15th European conference on artificial intelligence, Lyon, France
- Costa F, Frasconi P, Lombardo V, Sturt P, Soda G (2005) Ambiguity resolution analysis in incremental parsing of natural language. *IEEE Trans Neural Netw* 16:959–971
- Costa F, Lombardo V, Frasconi P, Soda G (2001) Wide coverage incremental parsing by learning attachment preferences. *Lect Notes Artif Intell* 2175:297–307
- Cutica I (2005) Neuropsychological evidence for linguistic and extralinguistic paths in communication. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy
- Cutica I, Bara BG, Bucciarelli M (2003) Extralinguistic pragmatic ability in right focal brain damaged patients. In: 5th European conference on cognitive science, 10–13 September 2003, Osnabruck, Germany
- Cutica I, Bara BG, Gindri P (2001) Extralinguistic communication in brain damage. In: Cavé C, Guaitella

- I, Santi S (eds) *Oralité et gestualité: interactions et comportements multimodaux dans la communication*. L'Harmattan, France
- Cutica I, Bucciarelli M, Bara BG (2006) Neuropragmatics: extralinguistic pragmatic ability is better preserved in left-hemisphere-damaged patients than in right-hemisphere-damaged patients. *Brain Lang* (in press)
- Cuzzucoli G, Lombardo V (1997) Physical model of the plucking process in the classical guitar. In: International computer music conference, Thessaloniki, Greece
- Cuzzucoli G, Lombardo V (1999) Physical model of the classical guitar, including the player's touch. *Comput Music J* 23:52–69
- Damiano R, Lombardo V, Pizzo A (2005) Formal encoding of drama ontology. *Lect Notes Comput Sci* 3805:95–104
- Damiano R, Lombardo V, Pizzo A (2005) Laying the foundations for a formal theory of drama. *Lect Notes Artif Intell* 3673:286–289
- De Vincenzi M, Lombardo V (eds) (2000) *Cross-linguistic perspectives on language processing*. Kluwer, Dordrecht
- Del Giudice M (2006) Increased residual variance at developmental switch points: statistical artifact or indicator of exposed genotypic influence? *Evolution* 60:192–195
- Di Tomaso V, Lombardo V, Lesmo L (1998) A computational model for the interpretation of static locative expressions. In: Olivier PL, Gapp K (eds) *Representation and processing of spatial expressions*. Lawrence Erlbaum Associates, Hillsdale, NJ
- Dobson R, Fitch J, Tazelaar K, Valle A, Lombardo V (2005) Varèse's 'Poème électronique' regained: evidence from the VEP project. In: International computer music conference, Barcelona, Spain
- Garbarini F, Adenzato M (2004) At the root of embodied cognition: cognitive science meets neurophysiology. *Brain Cogn* 56:100–106
- Geminiani G, Bucciarelli M (1998) Deductive reasoning in right-brain damaged. In: 20th conference of the Cognitive Science Society, 1–4 August 1998, Madison, WI
- Geminiani GC, Carassa A, Bara BG (1996) Causality by contact. In: Oakhill J, Garnham A (eds) *Mental models in cognitive science: essays in honour of P. Johnson-Laird*. Psychology Press, Hove, UK
- Georgiou I, Becchio C, Glover S, Castiello U (2006) Different action patterns for cooperative and competitive behaviour. *Cognition* (in press)
- Gilbert N, Terna P (2000) How to build and use agent-based models in social science. *Mind Soc* 1:57–72
- Johnson-Laird PN, Savary F, Bucciarelli M (2000) Strategies and tactics in reasoning. In: Schaeken WS, Vandierendonck A, De Vooght G, d'Ydewalle G (eds) *Deductive reasoning and strategies*. Erlbaum, Mahwah, NJ
- Lesmo L, Lombardo V, Bosco C (2002) Treebank development: the TUT approach. In: Sangal R, Bendre SM (eds) *Recent advances in natural language processing*. Vikas Publishing House, New Delhi
- Lolli G (1997) Mathematical training and deductive competence. *Cahiers de Psychologie Cognitive* 16:135–139
- Lombardo V (1995) Parsing and recovery. In: 17th conference of the Cognitive Science Society, July 12–15, Pittsburgh, PA
- Lombardo V (1998) A computational model of recovery. In: Fodor JD, Ferreira F (eds) *Reanalysis in sentence processing*. Kluwer, Dordrecht
- Lombardo V, Barbero C (1994) Syntactic trees and compact representations in natural language processing. In: Jorrand P, Sgurev V (eds) *Artificial intelligence: methodology, systems, applications*. World Scientific, Singapore
- Lombardo V, Lesmo L (1994) A compact syntactic representation. In: Martin-Vide C (ed) *Current issues in mathematical linguistics*, North-Holland, Amsterdam
- Lombardo V, Lesmo L (1996) An early-type recognizer for dependency grammars. In: 16th international conference on computational linguistics, Copenhagen
- Lombardo V, Lesmo L (1998) Formal aspects and parsing issues of dependency theory. In: 15th international conference on computational linguistics–36th annual meeting of the association for computational linguistics, Montreal, Canada
- Lombardo V, Lesmo L (2000) A formal theory of dependency syntax with non-lexical units. *Journal de Traitement Automatique des Langues* 41:179–210
- Lombardo V, Lesmo L, Seidenari C, Ferraris L (1998) Incremental processing and lexicalized grammars. In: 20th conference of the Cognitive Science Society, 1–4 August 1998, Madison, WI
- Lombardo V, Sturt P (1997) Incremental processing and infinite local ambiguity. In: 19th conference of the Cognitive Science Society, Stanford, CA
- Lombardo V, Sturt P (2002) Incrementality and lexicalism: a Treebank Study. In: Stevenson S, Merlo P (eds) *Lexical representations in sentence processing*. Benjamins, Amsterdam
- Mazzei A, Lombardo V (2004) A comparative analysis of extracted grammars. In: 16th European conference on artificial intelligence, Valencia, Spain
- Mazzei A, Lombardo V (2005) Building a wide coverage dynamic grammar. *Lect Notes Artif Intell* 3673:303–314
- Mazzei A, Lombardo V, Sturt P (2005) Strong connectivity hypothesis and generative power. In: 10th conference on formal grammar and 9th meeting on mathematics of language, Edinburgh, Scotland
- Pierno AC, Becchio C, Wall M, Smith AT, Castiello U (2006) Transfer of interfered motor patterns to self from others. *Eur J Neurosci* (in press)
- Radicioni D, Lombardo V (2005) A CSP approach for modeling the hand gestures of a virtual guitarist. *Lect Notes Artif Intell* 3673:470–473
- Radicioni D, Lombardo V (2005) Computational model of chord fingering. In: 27th conference of the Cognitive Science Society, 21–23 July 2005, Stresa, Italy

- Radicioni D, Lombardo V (2005) Fingering for music performance. In: International computer music conference, Barcelona, Spain
- Sacco K, Bucciarelli M, Adenzato M (2001) Mental models and the meaning of connectives: a study on children, adolescents and adults. In: 23rd conference of the Cognitive Science Society, August 1–4, Edinburgh, Scotland
- Sacco K, Galletto V, Blanzieri E (2003) How has the 9/11 terrorist attack influenced decision making? *Appl Cogn Psychol* 17:1113–1127
- Sturt P, Costa F, Lombardo V, Frasconi P (2003) Learning structural first-pass attachment preferences with dynamic grammars and recursive neural networks. *Cognition* 88:133–169
- Sturt P, Lombardo V (2004) Processing coordinated structures: incrementality and connectedness. *Cogn Sci* 29:291–305
- Tamietto M, Torrini G, Adenzato M, Pietrapiana P, Rago R, Perino C (2006) To drive or not to drive (after TBI)? A review of the literature and its implications for rehabilitation and future research. *NeuroRehabilitation* (in press)
- Terna P (2000) Economic experiments with Swarm: a neural network approach to the self-development of consistency in agents' behavior. In: Luna F, Stefansson B (eds) *Economic simulations in Swarm: agent-based modelling and object oriented programming*. Kluwer, Dordrecht
- Terna P (2000) The “mind or no mind” dilemma in agents behaving in a market. In: Ballot G, Weisbuch G (eds) *Applications of simulation to social sciences*. Hermes Science Publications, Paris
- Terna P (2002) Cognitive agents behaving in a simple stock market structure. In: Luna F, Perrone A (eds) *Agent-based methods in economics and finance: simulations in swarm*. Kluwer, Dordrecht
- Tinti C, Adenzato M, Tamietto M, Cornoldi C (2006) Visual experience is not necessary for efficient survey spatial cognition: evidence from blindness. *Q J Exp Psychol* (in press)
- Tirassa M (1994) Is consciousness necessary to high-level control systems? *Psychology* 5
- Tirassa M (1997) Mental states in communication. In: 2nd European conference on cognitive science, 9–11 April 1997, Manchester, UK
- Tirassa M (1999) Communicative competence and the architecture of the mind/brain. *Brain Lang* 68:419–441
- Tirassa M (1999) Taking the trivial doctrine seriously: functionalism, eliminativism, and materialism. *Behav Brain Sci* 22:851–852
- Tirassa M (2006) Agencies. In: Pérez Miranda LA, Larrazabal JM (eds) *Advances in cognitive science*. Kluwer, Dordrecht
- Tirassa M, Bosco FM, Colle L (2006) Rethinking the ontogeny of mindreading. *Conscious Cogn* (in press)
- Tirassa M, Bosco FM, Colle L (2006) Sharedness and privateness in human early social life. *Cogn Syst Res* (in press)
- Tirassa M, Carassa A, Geminiani G (2000) A theoretical framework for the study of spatial cognition. In: Nualláin SO (ed) *Spatial cognition. Foundations and applications*. Benjamins, Amsterdam
- Vallana M, Bosco FM, Bucciarelli M (2006) Conventional metaphors and communicative meanings. In: 2nd Biennial conference on cognitive science, 9–13 June 2006, St. Petersburg, Russia
- Walter H, Abler B, Ciaramidaro A, Erk S (2005) Motivating forces of human actions: neuroimaging reward and social interaction. *Brain Res Bull* 67:368–381
- Walter H, Adenzato M, Ciaramidaro A, Enrici I, Pia L, Bara BG (2004) Understanding intentions in social interaction: the role of the anterior paracingulate cortex. *J Cogn Neurosci* 16:1854–1863