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2010

Anna Esposito Antonietta M. Esposito
Raffaele Martone Vincent C. Müller
Gaetano Scarpetta (Eds.)

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Theoretical and Practical Issues

**Third COST 2102 International Training School
Caserta, Italy, March 2010
Revised Selected Papers**

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This book is dedicated to our needs,
that may overcome our goals and intentions one day,
though we resist.

Preface

This volume brings together the advanced research results obtained by the European COST Action 2102: "Cross Modal Analysis of Verbal and Nonverbal Communication." The research published in this book was discussed at the Third EUCOGII-COST 2102 International Training School entitled "Toward Autonomous, Adaptive, and Context-Aware Multimodal Interfaces: Theoretical and Practical Issues," held in Caserta, Italy, during March 15–19, 2010.

The school was jointly sponsored by:

a) COST (European Cooperation in Science and Technology, www.cost.eu) in the domain of Information and Communication Technologies (ICT) for disseminating the advances of the research activities developed within the COST Action 2102 (cost2102.cs.stir.ac.uk)
b) EUCogII: 2nd European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics (http://www.eucognition.org/).

The school afforded a change of perspective in verbal and nonverbal communication, where the research focus moved from "communicative tools" to "communicative instances" and asked for investigations that, in modeling interaction, will take into account not only the verbal and nonverbal signals but also the internal and external environment, the context, and the cultural specificity in which communicative acts take place.

The consequences in information communication technology (ICT) research should result in the development of autonomous, adaptive, and context-aware multimodal interfaces able to act by exploiting instantiated contextual and environmental signals and process them by combining previous experience (memory) adapted to the communicative instance. This new approach will foster artificial cognitive research by creating a bridge between the most recent research in multimodal communication (taking into account gestures, emotions, social signal processing etc.) and computation models that exploit these signals being aware of the context in which these signals are instantiated and of the internal and external environmental background. Human behavior exploits this information and adapts. Artificial cognitive systems must take account of this human ability for implementing a friendly and emotionally colored human machine interaction. In order to do this, investigations in cognitive computation must move from purely data-driven systems to behavioral systems able to "interact with human to achieve their goals," which may require ability to manifest intentions and goals through "resistance" to other intentions and goals (Müller argues in Chap. 1). In summary, cognitive models must be developed such that the current interactive dialogue systems, robots, and intelligent virtual avatars graphically embodied in

a 2D and/or 3D interactive virtual world, are able to interact intelligently with the environment, other avatars, and particularly with human users.

The themes of the papers presented in this book emphasize theoretical and practical issues for modelling cognitive behavioral systems, ranging from the attempts to describe brain computer interface (BCI) applications, a context-based approach to the interpretation and generation of dialogue acts, close synchronization among both speakers and listeners, mutual ratification, interaction and resistance, embodiment, language and multimodal cognition, timing effects on perception, action, and behaviors.

The book is arranged in two scientific sections according to a rough thematic classification, even though both sections are closely connected and both provide fundamental insights for the cross-fertilization of different disciplines.

The first section, "Human–Computer Interaction: Cognitive and Computational Issues," deals with conjectural and processing issues of defining models, algorithms, and strategies for implementing cognitive behavioral systems. The second section, "Synchrony Through Verbal and Nonverbal Signals," presents original studies that provide theoretical and practical solutions to the modelling of timing synchronization between linguistic and paralinguistic expressions, actions, body movements, activities in human interaction and on their assistance for an effective communication.

The papers included in this book benefited from the live interactions among the many participants of the successful meeting in Caserta. Over 150 established and apprenticing researchers converged for the event.

The editors would like to thank the Coordination Council of EUCogII and the ESF COST- ICT Programme for the support in the realization of the school and the publication of this volume. Acknowledgements go in particular to the COST Science Officers Matteo Razzanelli, Aranzazu Sanchez, Jamsheed Shorish, and the COST 2102 rapporteur Guntar Balodis for their constant help, guidance, and encouragement. Appreciation goes to the COST Publication Office for supporting and guiding the publication effort. The event owes its success to more individuals than can be named, but notably the members of the local Steering Committee Alida Labella, Olimpia Matarazzo, Nicola Melone, Giovanna Nigro, Augusto Parente, Paolo Pedone, Francesco Piazza, and Luigi Trojano who supported and encouraged the initiative as well as to the staff members Hicham Atassi, Ivana Baldassarre, Domenico Carbone, Vincenzo Capuano, Francesco Alessandro Conventi, Mauro De Vito, Davide Esposito, Paolo Fioretto, Marco Grassi, and Gianluigi Ombrato who were actively involved in the success of the event. Special appreciation goes to the International Institute for Advanced Scientific Studies (IIASS), with a special mention to the memory of Maria Marinaro, and to the IIASS team Tina Marcella Nappi, Michele Donnarumma, and Antonio Natale who provided precious technical support in the organization of the school. The editors are deeply indebted to Maria Teresa Riviello for the wonderful work done in taking care of the local organization.

In addition, the editors are grateful to the contributors for making this book a scientifically stimulating compilation of new and original ideas. Finally, the editors would like to express their greatest appreciation to all the members of the COST 2102 International Scientific Committee for their rigorous and invaluable scientific revisions, their dedication, and their priceless selection process.

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