Multimodal analysis of expressive gesture in music and dance performances

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Abstract. This paper presents ongoing research on the modelling of expressive gesture in multimodal interaction and on the development of multimodal interactive systems explicitly taking into account the role of non-verbal expressive gesture in the communication process. In this perspective, a particular focus is on dance and music as first-class conveyors of expressive and emotional content. Research outputs include (i) computational models of expressive gesture, (ii) validation by means of continuous ratings on spectators exposed to real artistic stimuli, and (iii) novel hardware and software components for the EyesWeb open platform (www.eyesweb.org), such as the recently developed Expressive Gesture Processing Library. The paper starts with a definition of expressive gesture. A unifying framework for the analysis of expressive gesture is then proposed. Finally, two experiments on expressive gesture in dance and music are discussed. This research work has been supported by the EU IST project MEGA (Multisensory Expressive Gesture Applications, www.megaproject.org) and the EU MOSART TMR Network.

1. Introduction

Expressive gesture is a key concept in our research (Camurri et al., 2001). This paper tries to face it and introduces two experiments aiming at understanding the non-verbal mechanisms of expressive/emotional communication.

Several definitions of gesture exist in the literature. The most common use of the term is with respect to natural gesture, which is defined as a support to verbal communication. For Cassel and colleagues (1990) "A natural gesture means the types of gestures spontaneously generated by a person telling a story, speaking in public, or holding a conversation". McNeill (1992) in his well-known taxonomy divides the natural gestures generated during a discourse in four different categories: iconic, metaphoric, deictic, and beats. In a wider perspective Kurtenbach and Hulteen (1990) define gesture as "a movement of the body that contains information". A survey and a discussion of existing definition of gesture can be found in (Cadoz and Wanderley, 2000).

In artistic contexts and in particular in the field of performing arts, gesture is often not intended to denote things or to support speech as in the traditional framework of natural gesture, but the information it contains and conveys is related to the

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Musical Robots and Interactive Multimodal Systems Jorge Solis,Kia Ng,2011-07-25 Musical robotics is a multi and trans disciplinary research area involving a wide range of different domains that contribute to its development including computer science multimodal interfaces and processing artificial intelligence electronics robotics mechatronics and more A musical robot requires many different complex systems to work together integrating musical representation techniques expressions detailed analysis and controls for both playing and listening The development of interactive multimodal systems provides advancements which enable enhanced human machine interaction and novel possibilities for embodied robotic platforms This volume is focused on this highly exciting interdisciplinary field This book consists of 14 chapters highlighting different aspects of musical activities and interactions discussing cutting edge research related to interactive multimodal systems and their integration with robots to further enhance musical understanding interpretation performance education and enjoyment It is dichotomized into two sections Section I focuses on understanding elements of musical performance and expression while Section II concentrates on musical robots and automated instruments Musical Robots and Interactive Multimodal Systems provides an introduction and foundation for researchers students and practitioners to key achievements and current research trends on interactive multimodal systems and musical robotics **Recent Perspectives on Gesture and Multimodality** Anabela Cruz-Santos,Isabel Galhano-Rodrigues,Elena Zagar Galvão,2019-07-14 What is gesture and what does it do What is the meaning of multimodality What do these concepts signify within the different theoretical approaches to interaction and communication among human beings Why do we study gesture and multimodality The thirteen chapters that make up this volume provide answers to these questions They bring together an eclectic set of recent studies on visible bodily actions conducted by junior and senior researchers and are a testimony to the curiosity and vitality that have always distinguished gesture studies This young yet rapidly growing field investigates the semiotic features of gesture in relation to speech as integral parts of utterances the different uses of gestures with and without speech such as gestures in language acquisition gestures in the performing arts music dance theatre and gestures in Artificial Intelligence Human Aspects in Ambient Intelligence Tibor Bosse,Diane J. Cook,Mark Neerincx,Fariba Sadri,2013-09-13 This book presents recent developments is the field of human aspects in Ambient Intelligence This field and the associated workshop series addresses multidisciplinary aspects of AmI with human directed disciplines such as psychology social science neuroscience and biomedical sciences The aim of the workshop series is to get researchers together from these human directed disciplines or working on cross connections of AmI with these disciplines The focus is on the use of knowledge from these disciplines in AmI applications in order to support humans in their daily living in medical psychological and social respects The book plays important role to get modellers in the psychological neurological social or biomedical disciplines interested in AmI as a high potential application area for their models From the other side the book may make researchers in Computer Science and

Artificial and Ambient Intelligence more aware of the possibilities to incorporate more substantial knowledge from the psychological neurological social and biomedical disciplines in AmI architectures and applications **A Pragmatic Approach to Fluency and Disfluency in Learner Language** Maximiliane Frobenius,2022-11-15 This monograph presents analyses of filled and unfilled pauses cut offs repair discourse markers and other phenomena often referred to as disfluencies in the context of advanced language learners PowerPoint presentations It adopts a multimodal perspective to demonstrate the functions of these elements in interaction Paired with gaze shifts pointing gestures and posture shifts they act as facilitators of joint visual orientation mutual understanding and accountable actions Therefore this volume suggests the name cofluency to reflect their potential functionality Cofluencies are essential elements of multimodal chunks and multimodal patterns and these are building blocks of a multimodal turn taking mechanism for presentations These concepts are illustrated and discussed based on excerpts from naturally occurring classroom data *Introducing Evolutionary Pragmatics* Ines Adornetti,Francesco Ferretti,2024-11-19 This collection highlights a range of perspectives on the emerging body of research on evolutionary pragmatics expanding the borders of language evolution research and indicating exciting new directions for the future of the field The volume adopts a broad view of pragmatics providing a counterpoint to classical models of language evolution by exploring the ways in which the origins of language can be traced through the emergence of language structures from use in context The book synthesizes different lines of inquiry ranging from evolutionary linguistics to cognitive linguistics philosophy and cognitive pragmatics among other fields which foreground the impact of the environment on language and of language through speaker use on context The volume is organized around three sections each taking in turn a different dimension of evolutionary pragmatics research the origins of language as seen in animal communication a closer look at the use of language in interaction for the formation of communication channel and linguistic meaning the role of cooperation and competition dynamics for the emergence of language structure This book will be of particular interest to scholars in evolutionary linguistics language origins cognitive pragmatics cognitive archaeology and cognitive semiotics as well as related areas in philosophy psychology and anthropology Telecinematic Stylistics Christian Hoffmann,Monika Kirner-Ludwig,2020-05-14 Over the last two decades the study of discourse in film and television has become one of the most promising research avenues in stylistics and pragmatics due to the dazzling variety of source material and the huge pragmatic range within it Meanwhile with the advent of streaming and the box set film and television themselves are becoming separated by an increasingly blurred line This volume closes a long standing gap in stylistics research bringing together a book level pragmastylistic showcase It presents current developments from the field from two complementary perspectives looking stylistically at the discourse in film and the discourse of and around film This latter phrase comes to mean the approaches which try to account for the pragmatic effects induced by cinematography This might be the camera work or the lighting or the mise en sc ne or montage The volume takes a multimodal approach looking at word

movement and gesture in keeping with modern stylistics The volume shows how pragmatic themes and methods are adapted and applied to films including speech acts im politeness implicature and context In this way it provides systematic insights into how meanings are displayed enhanced suppressed and negotiated in both film and televisual arts *The Oxford Handbook of Affective Computing* Rafael A. Calvo,Sidney D'Mello,Jonathan Gratch,Arvid Kappas,2015-01-15 Affective Computing is a growing multidisciplinary field encompassing computer science engineering psychology education neuroscience and many other disciplines It explores how affective factors influence interactions between humans and technology how affect sensing and affect generation techniques can inform our understanding of human affect and on the design implementation and evaluation of systems that intricately involve affect at their core The Oxford Handbook of Affective Computing will help both new and experienced researchers identify trends concepts methodologies and applications in this burgeouning field The volume features 41 chapters divided into five main sections history and theory detection generation methodologies and applications Section One begins with a look at the makings of AC and a historical review of the science of emotion Chapters discuss the theoretical underpinnings of AC from an interdisciplinary perspective involving the affective cognitive social media and brain sciences Section Two focuses on affect detection or affect recognition which is one of the most commonly investigated areas in AC Section Three examines aspects of affect generation including the synthesis of emotion and its expression via facial features speech postures and gestures Cultural issues in affect generation are also discussed Section Four features chapters on methodological issues in AC research including data collection techniques multimodal affect databases emotion representation formats crowdsourcing techniques machine learning approaches affect elicitation techniques useful AC tools and ethical issues in AC Finally Section Five highlights existing and future applications of AC in domains such as formal and informal learning games robotics virtual reality autism research healthcare cyberpsychology music deception reflective writing and cyberpsychology With chapters authored by world leaders in each area The Oxford Handbook of Affective Computing is suitable for use as a textbook in undergraduate or graduate courses in AC and will serve as a valuable resource for students researchers and practitioners across the globe **Emotion Recognition and Understanding for Emotional Human-Robot Interaction Systems** Luefeng Chen,Min Wu,Witold Pedrycz,Kaoru Hirota,2020-11-13 This book focuses on the key technologies and scientific problems involved in emotional robot systems such as multimodal emotion recognition i e facial expression speech gesture and their multimodal emotion recognition and emotion intention understanding and presents the design and application examples of emotional HRI systems Aiming at the development needs of emotional robots and emotional human robot interaction HRI systems this book introduces basic concepts system architecture and system functions of affective computing and emotional robot systems With the professionalism of this book it serves as a useful reference for engineers in affective computing and graduate students interested in emotion recognition and intention understanding This book offers the latest approaches to this active research

area It provides readers with the state of the art methods of multimodal emotion recognition intention understanding and application examples of emotional HRI systems *International Conference on Multimodal Interfaces* ,2003 **Intelligent Information Technologies** Vijayan Sugumaran,2008 This collection compiles research to drive further evolution and innovation of these next generation technologies and their applications of which the scientific technological and commercial communities have only begun to scratch the surface It is an essential reference acquisition for any library seeking to cover the leading edge of technological innovations Provided by publisher **Linguistics and Language Behavior Abstracts** ,2009 **ICMI '06** ,2006 *Proceedings* ,2005 Functional Neuroanatomy: Text and Atlas, 2nd Edition Adel K. Afifi,Ronald A. Bergman,2005-02-18 A Doody s Core Title Superbly illustrated this core textbook reinforces an understanding of basic neuroanatomical structures by emphasizing their clinical significance in neurologic disease Featuring a seamless integration of over 400 illustrations within the text Functional Neuroanatomy includes cross sectional atlas views of the brain and brain stem MRI images in three planes and key concepts identified within each chapter *Mapping Multimodal Performance Studies* Maria Grazia Sindoni,Janina Wildfeuer,Kay O'Halloran,2016-12-01 This book is a first attempt to map the broad context of performance studies from a multimodal perspective It collects original research on traditional performing arts theatre dance opera live durational performance and mediated recorded performances films television shows as well as performative discursive practices on social media by adopting several theories and methodologies all dealing with the notion of multimodality As a mostly dynamic and also interactive environment for various text types and genres the context of performance studies provides many opportunities to produce meaning verbally and non verbally All chapters in this book develop frameworks for the analysis of performance related events and activities and explore empirical case studies in a range of different ages and cultures A further focus lies on the communicative strategies deployed by different communities of practice taking into account processes of production distribution and consumption of such texts in diverse spatial and temporal contexts *Multimodal Analysis and Synthesis of Affective Human Body Gestures from Speech Prosody* Elif Bozkurt,2016 **Modelling and Analysing Expressive Gesture in Multimodal Systems** Antonio Camurri,Barbara Mazzarino,Gualtiero Volpe,2008 **Multimodal Analysis of Gestures** Tsz Shan Beatrice Leung,Hong Kong Polytechnic University. Dept. of English,2014 **Interactions, Images and Texts** Sigrid Norris,Carmen Daniela Maier,2014-08-20 Multimodality is a fast growing interdisciplinary approach that aims to analyze the interplay of multiple modes such as gaze gesture or spoken language that are utilized in interaction and to examine the multimodal production and consumption of communicated messages This Reader provides a comprehensive text of current research into multimodality outlining in depth delineation of each primary theoretical and methodological approach as well as personal accounts of scholars who are responsible for the various approaches advancements The book additionally offers a plethora of analysis chapters written by scholars from across the world with vastly diverse themes ranging from buying popcorn protests in Oman coaching sessions

and identity to kitesurfing typography TV news billboards workplace practices or analyzing web pages Facebook comic books and more Flexible and easy to use the Reader includes key terms suggested further readings and a project idea for each chapter The key terms for the chapters also comprise the extensive alphabetical glossary Brief introductions for the analysis chapters written by the editors summarize the topic explain the methodology used outline the thematic orientation and link each chapter to other chapters in the book Showcasing multimodal analysis in detail this Reader is essential reading for undergraduate and postgraduate students for emergent researchers and for advanced scholars who wish to gain insight into the current state of multimodal research **Analyzing Multimodal Interaction** Sigrid Norris,2004-06-10 A practical guide to understanding and investigating the multiple modes of communication verbal and non verbal Sets out clear methodology to help readers conduct their own analysis and includes many real examples

The Enigmatic Realm of **Chapter 4 Multimodal Analysis Of Expressive Gesture In**: Unleashing the Language is Inner Magic

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