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# ACE: how Artificial Character Embodiment shapes user behaviour in multi-modal interactions

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## ABSTRACT

The ACE - how Artificial Character Embodiment shapes user behavior in multi-modal interactions - workshop aims to bring together researchers, practitioners and experts on the topic of embodiment, to analyze and foster discussion on its effects on user behavior in multi-modal interaction. ACE is aimed at stimulating multidisciplinary discussions on the topic, sharing recent progress, and providing participants with a forum to debate current and future challenges. The workshop includes contributions from computational, neuroscientific and psychological perspectives, as well as technical applications.

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## 1 WORKSHOP GOALS

The body shapes the mind: bodily representations structure the way humans perceive the world and the way they perceive other people. Cognitive sciences and social sciences altogether have stressed the importance of embodiment in social interaction, highlighting how interacting with others influences how we behave, perceive and think [13, 14]. As the sense of embodiment can be defined as “the ensemble of sensations that arise in conjunction with being inside,

having, and controlling a body” [9], it definitely influences self-perceptions and actions regarding one’s own avatar, but also our social behaviors with embodied intelligent agents such as virtual humans and robots [7]. Therefore, embodiment has become increasingly important in human-computer interaction, since the design of artificial agents needs to take into account how their bodily, expressive and behavioral features can affect user behaviors [6]. Following this, the ACE workshop aims to gather researchers, practitioners and experts on the topic of embodiment, to analyze and discuss the topic in a multidisciplinary arena, fostering debate and sharing of ideas and practices and to highlight future challenges. Moreover, ACE focuses on strengthening the attention towards multi-modal interactions in immersive environments, an increasingly relevant topic with the advent of metaverse technologies.

## 2 WORKSHOP CONTENT

The workshop starts with the organizers welcoming participants and with an introduction to embodiment and to its role in multi-modal interactions. After this, the workshop features keynote talks from invited speakers and presentations from selected authors.

### 2.1 Keynote speakers

The workshop has the pleasure of hosting two keynote talks by Domna Banakou and Alessandra Sciutti.

**Domna Banakou** is visiting Assistant Professor at New York University Abu Dhabi. Her research focuses on how transformations of the virtual bodily appearance lead to perceptual, behavioral, and higher-level cognitive correlates. In her keynote Domna will illustrate the Golden Rule Embodiment Paradigm, tackling how VR can be used to foster prosocial behavior and how this positive effect is based on an embodied experience of harm that can help empathize with victims, this enhancing helping behavior.

**Alessandra Sciutti** from Italian Institute of Technology, IIT, Genova, Italy. Alessandra is Tenure Track Researcher and head of the CONTACT (COgNiTive Architecture for Collaborative Technologies) Unit of the Italian Institute of Technology (IIT). Her work focuses on the sensory and motor mechanisms underlying mutual

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understanding in human-human and human-robot interaction. In her talk, Alessandra addresses the underpinnings of human-robot understanding, illustrating the role of embodiment in this form of social interaction.

## 2.2 Workshop contributions

The scientific committee selected 4 papers to be presented:

Gujran and Jung, *Multimodal prompts effectively elicit robot-initiated social touch interactions*

Goncharov et al., *Expectations vs. Reality: The Impact of Adaptation Gap on Avatars in Social VR Platforms*

Kalashnikova et al., *Do We Speak to Robots Looking Like Humans As We Speak to Humans? A Study of Pitch in French Human-Machine and Human-Human Interactions*

Ayache et al., *EXtended Reality of socio-motor interactions: Current Trends and Ethical Considerations for Mixed Reality Environments Design*

In addition, Enchanted Tools will present the Mirokai, the first robot character, combining world-class engineering and character design expertise to bring a new generation of helping robots.

## 3 WORKSHOP ORGANIZATION

The organizing committee is made up of researchers and PhD students from a broad set of backgrounds, namely:

**Beatrice Biancardi** is Associate Professor at LINEACT CESI, France. Her research interests include social behavior modeling by applying social signal processing to human-human [2] and human-agent interaction [1], with a focus on immersive environments and the Proteus effect.

**Thomas Janssoone** did his Ph.D. at Sorbonne University and Telecom ParisTech on the study of recognition and synthesis of interpersonal stances with virtual agents [8]. Today, Thomas designs an end-to-end interaction pipeline for the Mirokai to make them interact naturally in real environments.

**Eleonora Ceccaldi** is a researcher at CasaPaganini InfoMus, University of Genoa and licensed psychologist. She works on event segmentation, event structure perception [3] and food-related social interaction [10].

**Sara Falcone** is a Ph.D. candidate at University of Twente, and she is currently spending an academic year in Princeton University as visiting researcher. Her research focuses on the relationship between the Sense of Embodiment (SoE) and teleoperation [4].

**Geoffrey Gorisse** is Associate Professor and virtual reality researcher at Arts et Métiers Institute of Technology, France. Following post-doctoral research on embodiment and vicarious agency [5] at the Event Lab, University of Barcelona, his current investigations focus on virtual characters (avatars and agents).

**Pierre Raimbaud** is Associate Professor at ENISE, Ecole Centrale de Lyon, France. He focused on theoretical approaches for the design of user interactions during his PhD, and then studied human-agent interactions in populated virtual environments [11]. His current research focuses on understanding of human behaviors in virtual reality, from a user and social point of view [12].

**Anna Martin** is a Ph.D. student at LINEACT CESI, France. Her Ph.D. project focuses on the Proteus effect, which describes how

the appearance of avatars in virtual environments can shape users' behaviors.

**Silvia Ferrando** is a Ph.D. student at CasaPaganini InfoMus, University of Genoa. Her research focuses on learning technologies, in particular with children as users.

## 4 ACKNOWLEDGEMENTS

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