

From Babies to Robots: Developmental Robotics for Embodied Language Learning

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Growing theoretical and experimental research on action and language processing and on number learning and gestures clearly demonstrates the role of embodiment in cognition and language processing. In psychology and neuroscience this evidence constitutes the basis of embodied cognition, also known as grounded cognition (Pezzulo et al. 2012; Borghi & Cangelosi 2014). In robotics, these studies have important implications for the design of linguistic capabilities in cognitive agents and robots for human-robot communication, and have led to the new interdisciplinary approach of Developmental Robotics (Cangelosi & Schlesinger 2015). During the talk we will present examples of developmental robotics models and experimental results from iCub experiments on the embodiment biases in early word acquisition and grammar learning (Morse et al. 2015; Morse & Cangelosi 2017) and experiments on pointing gestures and finger counting for number learning (De La Cruz et al. 2014). The implications for the use of such embodied approaches for symbol grounding and for robot companion applications will also be discussed.

References

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Short Bio

Angelo Cangelosi is Professor of Artificial Intelligence and Cognition and the Director of the Centre for Robotics and Neural Systems at Plymouth University (UK). Cangelosi studied psychology and cognitive science at the Universities of Rome La Sapienza and at the University of Genoa, and was visiting scholar at the University of California San Diego and the University of Southampton. Cangelosi's main research expertise is on language grounding and embodiment in humanoid robots, developmental robotics, human-robot interaction, and on the application of neuromorphic systems for robot learning. He currently is the coordinator of the UK EPSRC project “BABEL: Bio-inspired Architecture for Brain Embodied Language” (2012-2016) and of the EU H2020 Marie Skłodowska-Curie European Industrial Doctorate “APRIL: Applications of Personal Robotics through Interaction and Learning” (2016-2019). He also is Principal investigator for the ongoing projects “THRIVE” (US Air Force Office of Science and Research, 2014-2018), the FP7 projects

POETICON++ and ROBOT-ERA, and the Marie Curie projects SECURE, DCOMM, ORATOR and DECORO. He was coordinator of the ITALK Integrating project and the RobotDoc ITN. Overall, he has secured over £15m of research grants as coordinator/PI. Cangelosi has produced more than 250 scientific publications, and has chaired numerous workshops and conferences including the IEEE ICDL-EpiRob 2011 and 2013 Conferences (Frankfurt 2011, Osaka 2013). In 2012-13 he was Chair of the IEEE Technical Committee on Autonomous Mental Development. He has been Visiting Professor at Waseda University (Japan) and Messina University (Italy). Cangelosi is Editor (with K. Dautenhahn) of the journal *Interaction Studies*, and in 2015 was Editor-in-Chief of *IEEE Transactions on Autonomous Development*. His latest book "Developmental Robotics: From Babies to Robots" (MIT Press; co-authored with Matt Schlesinger) was published in January 2015.