

MELISSA MONTI


FULL NAME: Melissa Monti


Biomedical/Neural Engineer
Ph.D. student in Bioengineering

TECHNICAL SKILLS


Matlab	● ● ● ● ●
EGLAB and Brainstorm	● ● ● ● ●
Python	● ● ● ● ●
Scientific writing	● ● ● ● ●
Ansys	● ● ● ● ●
Labview	● ● ● ● ●
C++	● ● ● ● ●

LANGUAGE SKILLS

 **Italian** – mother tongue

 **English** – *Listening: C1; Reading: C1; Speaking: C1; Writing: C1*

Jun 2020 – Cambridge Certificate in Advanced English (CAE), level C1

 **France** – *Listening: A1; Reading: A2; Speaking: A1; Writing: A1*

COMMUNICATION AND MANAGEMENT SKILLS

During my research period at the Cognitive Neurophysiology Laboratory, I developed the ability to work individually, while acting as a team player. This experience also taught me to interact with other people, speaking different languages and coming from different social and cultural contexts.

WORK EXPERIENCE

Sept 2022 – ongoing – **Teaching Tutor**
University of Bologna, Campus of Cesena, Cesena (Italy)
Course: Physiology

EDUCATION AND TRAINING

Nov 2022 – ongoing – **Ph.D. Student in Biomedical, Electrical and Systems Engineering (IBES)**
University of Bologna, Bologna (Italy)
Project A multimodal study of the development of perceptual abilities in ASD

11 Jun – 16 Jun 2023 – **Summer School on Neurorehabilitation (SNNR)**
Baiona (Spain)

Hosted by Imperial College of London
Shirley Ryan AbilityLab
Hospital Los Madroños

2022 – **Master Degree in Biomedical Engineering for Neuroscience**
University of Bologna, Campus of Cesena, Cesena (Italy)
Final grade: 110/110 cum Laude
Score weighted average: 30/30

Aug – Sept 2022 – **Master Thesis Student**
Albert Einstein College of Medicine, The Cognitive Neurophysiology Laboratory (CNL), New York (USA)
Project Investigating perceptual multisensory impairments in Autism through a neural network: a possible neural implementation for the shift from cross-modal competition to facilitation.

Feb – May 2022 – **Research Internship**
University of Bologna, Bologna (Italy)
Department of Psychology, University of Milano Bicocca (Italy)
Project Neuro-computational modelling and EEG data processing of mirror-touch synesthesia.

Oct 2020 – Feb 2021 – **Courses**
The Biorobotics Institute, Sant'Anna School of advanced studies, Pontedera (Italy)

- Neuromorphic Engineering
- Biological data mining
- Statistical signal processing
- Measurement and instrumentation for bionic systems
- Soft and smart materials.

Oct 2020 – **Course**
Dec 2020 *IMT School for Advanced Studies Lucca, Lucca (Italy)*

Behavioural and cognitive neuroscience.

2020 **Bachelor Degree in Biomedical Engineering**
University of Bologna, Campus of Cesena, Cesena (Italy)

Final grade: 110/110 cum Laude

Score weighted average: 29.68/30

CONFERENCES AND SEMINARS

21 Jun – 23 Jun 2023 VIII National Congress on Bioengineering 2023
Padua (Italy),

8 Jun – 9 Jun 2023 Brain-inspired computing workshop
Modena (Italy)

25 Apr – 27 Apr 2023 International IEEE/EMBS Conference on Neural Engineering
Baltimore (USA)

3 Jul – 7 Jul 2023 International Multisensory Research Forum 2022
Ulm (Germany)

23 Apr – 26 Apr 2022 CNS Annual Meeting 2022
San Francisco (USA)

Apr 2022 Seminar: Neurocomputational modelling of causal inference.
UCLA, Los Angeles, California (USA)

Oct 2021 Seminar: A neurocomputational model of the lexical-semantic memory exploiting Hebbian training rules to learn word-concept association.
University of Bologna, Bologna (Italy)

TALKS

Invited speech: **Investigating perceptual multisensory impairments in Autism through a neural network: a possible neural implementation for the shift from cross-modal competition to facilitation**, Albert Einstein College of Medicine, 14 Sep 2022.

PUBLICATIONS

Article

Monti, M., Molholm, S., & Cuppini, C. Atypical developmental trajectories of causal inference in autism spectrum disorders inferred through a neuro-computational model. *Frontiers in computational neuroscience*, SUBMITTED.

Abstract

Monti, M., Bisi, M. C., Stagni, R., Cuppini, C. The neural bases of sensory reweighting for postural control: a neuro-computational model. *XXIII National Congress SIAMOC 2023*, Rome (Italy), 4 Oct – 7 Oct.

Abstract

Cuppini, C., **Monti, M.**, Magosso, E., Yau, J. Visual bias on bimanual tactile perception: investigation of the neural mechanisms using neurocomputational modelling. *International Multisensory Research Forum 2023*, Brussels (Belgium), 27 Jun-30 Jun (Poster 81).

Long abstract

Monti, M., Molholm, S., Cuppini, C. A neural model of sensory interactions in young neurotypical and ASD children. *VIII National Congress on Bioengineering 2023*, Padua (Italy), 21 Jun-23 Jun. (Abstract ID: 1643).

Abstract

Monti, M., Molholm, S., Cuppini, C. A model of the maturation of sensory interactions: from cross-modal competition to facilitation in Autism. *2023 11th International IEEE/EMBS Conference on Neural Engineering*, Baltimore (USA), 25 Apr-27 Apr (Abstract 406, Paper ID: 1570881557)

Article

Cuppini, C., Magosso, E., **Monti, M.**, Ursino, M., & Yau, J. M. (2022). A neurocomputational analysis of visual bias on bimanual tactile spatial perception during a crossmodal exposure. *Frontiers in neural circuits*, 16, 933455. <https://doi.org/10.3389/fncir.2022.933455>

Abstract

Stein, B. E., Rowland, B. A., **Monti, M.**, Magosso, E., Cuppini, C. Neural Mechanisms Underlying the Reversal of Hemianopia with Multisensory Training. *International Multisensory Research Forum 2022*, Ulm (Germany), 3 Jul -7 Jul (Poster 4:30, Abstract 291).

Abstract

Cuppini, C., **Monti, M.**, Ursino, M., Shams, L. A Hebbian model of the lexical-semantic memory helps explain the multisensory benefit in learning name-face association. *CNS Annual Meeting 2022*, San Francisco (USA), 23 Apr -26 Apr (Poster Session A, Abstract 53).

HONOURS AND AWARDS

2023	Best thesis award GNB "Nearlab 2023 - Politecnico di Milano" <i>Gruppo Nazionale di Bioingegneria (GNB)</i>
2020	Merit-based award for laudable students enrolled in the A.Y. 2019/20 <i>University of Bologna</i>
2019	Merit-based award for laudable students enrolled in the A.Y. 2018/19 <i>University of Bologna</i>
2018	Award for enrollment in courses relating to disciplinary areas of particular national interest <i>University of Bologna</i>

DRIVING LICENSE

Cars: B

Bologna, Italy, 21/07/2023

RESEARCH ACTIVITY

My research activity mainly concerns the study of multisensory and sensorimotor integration and how they shape brain function, dysfunction and behaviour. I use neuro-computational modelling and EEG data processing with the following aims:

- Unveil brain structures and mechanisms involved in perceptual, cognitive and motor processes;
- Study brain dynamics and connectivity;
- Simulate clinical populations far larger than the real ones, investigating the differences compared to the healthy population;
- Study the learning mechanisms that guide the maturation of cognitive and motor abilities, both in normotypical subjects and in clinical populations
- Make predictions, which can guide future experiments carried out to increase neurophysiological knowledge and validate the proposed mechanisms;
- Suggest and design novel rehabilitation strategies, explaining their effects.

The research activity is carried out in collaboration with several national and international research centers, as detailed in this document.

Below is a brief summary of the main research activities:

Mechanisms underlying sensory perception and its maturation. This project aims to attain a theoretical understanding of sensory perception. EEG processing and neurocomputational approaches are combined to simulate and study the neural circuits, mechanisms, dynamics, and rhythms responsible both for the unisensory perception of stimuli of different sensory modalities (auditory, visual, tactile), and for their integration (occurring in different regions and structures of the central nervous system). These models are used to analyze the role of the multisensory perception in decision-making processes, such as the causal inference problem. Learning algorithms are implemented to investigate the maturation of perceptual and integrative abilities during the post-natal life, based on the sensory experience subjects are exposed to.

*Collaborations: **Sophie Molholm** – Albert Einstein College of Medicine (New York, USA); **John Foxe** – Rochester School of Medicine and Dentistry (New York, USA); **Ladan Shams** – UCLA (Los Angeles, USA); **Jeffrey M. Yau** – Baylor College of Medicine (Houston, USA); **Nadia Bolognini** – University of Milano-Bicocca (Milan, Italy).*

A multimodal study of sensory interactions in Autism: towards a multisensory rehabilitation strategy for treating early perceptual deficits. The neuro-computational models and EEG data processing are applied to the study of subjects with Autism. The aims are (1) identify how perceptual and cognitive mechanisms differ in subjects with Autism and controls; (2) investigate how these skills are acquired during childhood through adolescence; (3) clarify how the core social symptoms traditionally associated to Autism result from low level perceptual deficits. Finally, models' predictions will be used to design specific interventions to treat early perceptual deficits in Autism, resulting in the improvement of social and cognitive deficits as well.

*Collaborations: **Sophie Molholm** – Albert Einstein College of Medicine (New York, USA); **John Foxe** – Rochester School of Medicine and Dentistry (New York, USA); **Laura Astolfi** – University of Rome La Sapienza (Rome, Italy).*

Mechanisms underlying the recovery of visual responsiveness in subjects with Hemianopia . Neuro-computational models are used to elucidate mechanisms underlying reversal of Hemianopia following a multisensory training.

*Collaborations: **Barry E. Stein** and **Benjamin Rowland** – Wake Forest University (Winston-Salem, USA).*

Neural control of posture and gait. This project will elucidate the neural circuits and the brain structures responsible for postural and movements control, focusing in particular on the role of sensory interactions. The project aims at analyzing the maturation of these abilities throughout childhood and how they differ in clinical populations compared to controls.

*Collaborations: **Maria Cristina Bisi** and **Rita Stagni** – University of Bologna (Bologna, Italy).*