Arianna Brancaccio

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I am a Postdoctoral researcher in Cognitive & Brain Sciences at CIMeC (Center for Mind/Brain Science) at the University of Trento. With a deep focus on brain state-dependent EEG-TMS, TMS-EEG, MEG, and EEG data collection and analysis, my work centers on understanding structural and functional plasticity, both in healthy and clinical populations. I have advanced knowledge in data analysis techniques and am especially interested in how the different sources of variability in neuroscience data can influence studies' results. I'm dedicated to combining real-time functional and structural data to better capture individual differences and enhance the reproducibility of TMS-EEG, EEG, and MEG research.

Education

11/2018 – 3/2023 - **PhD in Cognitive & Brain Sciences -** Cum Laude
"*Towards Individualized TMS-EEG pipelines for stroke rehabilitation: the importance of individual structural and functional variability*"
Centre for Mind/Brain Sciences - University of Trento, Trento (IT)

09/2016 – 07/2018 – **Master's degree in Cognitive Neuroscience -** 110/110 cum Laude
"*Source reconstruction of oscillatory patterns in sleep stages*"
Centre for Mind/Brain Sciences - University of Trento, Trento (IT)

09/2012 – 09/2016 - **Bachelor's Degree in Psychological Sciences and Techniques -** 110/110 cum Laude
"*Analisi dei disturbi cognitivi, psicologici e comportamentali nella malattia di Huntington*"
University Luigi Vanvitelli, Napoli (IT)

09/2007 – 06/2012 - **High school leaving qualification in classical studies**
Liceo Classico "Quinto Orazio Flacco", Portici (NA), Italy

Research experience

2/2023 – Present – **Postdoctoral Research Fellow**
Centre for Mind/Brain Sciences - University of Trento, Trento (IT)

- Implementation of behavioural experiment.
- Implementation of EEG experiment.
- Implementation of TMS-EEG experiment.
- Implementation of real-time EEG-TMS experiment.
- Advanced analysis of TMS-EEG data.
- OSF Preregistration writing.

3/2023 – 1/2024 – **Research Fellow**
Centre for Mind/Brain Sciences - University of Trento, Trento (IT)

- Implementation of EEG/TMS-EEG experiment.
- Development of advanced cleaning pipelines for TMS-EEG data.
- Participation in organizing international workshop.

11/2018 – 3/2023 - **PhD in Cognitive & Brain Sciences**

- Advanced analysis of TMS-EEG data from clinical (stroke) and healthy population.
- Advanced analysis of MRI structural data and MEG connectivity, in the context of healthy aging.
- Experience in setting up and running brain-state dependent EEG-TMS experiments.
- Experience in data-analysis and advanced pipelines development for TMS-EEG, EEG and MEG data.
- Meta-analysis on post-stroke brain plasticity literature, with a focus on the reliability of rehabilitation protocols.
- Collaboration in Grant writing.

09/2017 – 07/2018 - **Master's degree in Cognitive Neurosciences**

- Experience as autonomous user in developing MEG experiments and conducting recordings (standard settings and sleep research).
- Experience in developing data-analysis and advanced MEG pipeline design.

04/2017 – 07/2017 - **Independent Studies at the Attention and Perception Lab (CIMeC)**

- Experience in behavioural experiment development and data collection.

Computer skills: Expert MATLAB programming, Proficient R programming, Beginner Python programming. Softwares and Toolboxes: FieldTrip, SPM, Brainstorm, EEGLAB , TESA, NeurONE system for EEG-TMS data collection, G.Tec system for EEG and TMS-EEG data collection, Softaxic System.

Teaching experience

2024: Teaching assistant for Master's course "Brain Stimulation and Multimodal Electrophysiological Recording"
Centre for Mind/Brain Sciences - University of Trento, Trento (IT)

2022: Teaching assistant for Master's course "Advanced Hands on M/EEG Analysis"
Centre for Mind/Brain Sciences - University of Trento, Trento (IT)

	2022: Teaching assistant for Master's course "Multimodal Electrophysiological Recording and Stimulation" Centre for Mind/Brain Sciences - University of Trento, Trento (IT)
Publications (peer reviewed)	Brancaccio A., Tabarelli D., Zazio A., Bertazzoli G., Metsomaa J., Ziemann U., Bortoletto M., Belardinelli P.– "*Towards the definition of a standard in TMS-EEG data preprocessing*" – Neuroimage - **2024** Mahmoud, W., Baur, D., Zrenner, B., Brancaccio, A., Belardinelli, P., Ramos-Murguialday, A., ... & Ziemann, U. – "*Brain state-dependent repetitive transcranial magnetic stimulation for motor stroke rehabilitation: a proof of concept randomized controlled trial*." Frontiers in Neurology – **2024** Tabarelli D.*, Brancaccio A.*, Zrenner C., Belardinelli P. - *"Functional Connectivity States of Alpha Rhythm Sources in the Human Cortex at Rest: Implications for Real-Time Brain State Dependent EEG-TMS"* - Brain Sciences - **2022** Brancaccio A., Tabarelli D., Belardinelli P. - "*A New Framework to Interpret Individual Inter-Hemispheric Compensatory Communication after Stroke*" - Journal of Personalized Medicine - **2022** Brancaccio A.*, Tabarelli D.*, Bigica M., Baldauf D. - "*Cortical source localization of sleep-stage specific oscillatory activity*" - Scientific reports - **2020**
Other Publications	A. Brancaccio, M. Tagliaferri, C. Miniussi, L. Cattaneo – "*Temporal and Topographical Signatures of Predictive and Reactive Strategies in a Simple Motor Task: an EEG study*" – **under review** H. Ramirez, D. Tabarelli, A. Brancaccio, P. Belardinelli, E. B. Marsh, M. Funke, J. C. Mosher, F. Maestu, M. Xu, D. Pantazis – "*Fully Hyperbolic Neural Networks for Studying Aging Trajectories in MEG Brain Networks*" – **under review** A. Brancaccio, D. Tabarelli, D. Baur, J. Rosch, W. Mahmoud, U. Ziemann, P. Belardinelli – *"Motor Cortex Excitability States in Chronic Stroke Patients probed by EEG-TMS"* – **under review** A. Brancaccio, D. Tabarelli, P. Belardinelli – *"Region-specific impact of aging on cortical myelination and thickness"* – bioRxiv – **2023**
Poster Presentations	**"Evaluating TMS-EEG Preprocessing Pipelines: A Comparative Analysis"** Best Poster Award at TBS CNW - Transcranial Brain Stimulation in Cognitive Neuroscience Workshop, November 29–30, 2024.

"Specialization and Connectivity of Frontal Gyri in Predictive vs. Reactive Strategies: Insights from a TMS-EEG Study"
10th Science Factory – 30th Aug – 4th September 2024

"Functional connectivity states of alpha rhythm sources in the human cortex at rest: implications for real-time brain state dependent EEG-TMS"
BIOMAG 2022 - International Conference on Biomagnetism - 28 Aug – 1st September 2022

"Myeloarchitectonic properties of sensorimotor areas influence thinning in aging"
OHBM 2022 – Organization for Human Brain Mapping - 19-23 June 2022

"A new framework to interpret individual inter-hemispheric compensatory communication after stroke"
E.W.C.N - European Workshop on Cognitive Neuropsychology - 24-28 January 2022

"Implicit chunking of information in a working memory task"
RAW Rovereto Attention Workshop, 2019- 24-26 October 2019

"Behavioural Sequences and Chunking Mechanisms"
CAOs 2019 - Rovereto Workshop on Concepts, Actions and Objects - 2-4 May 2019

Conferences and Talks

8 March 2024
Symposium talk – DGKN24 – Deutsche Gesellschaft für Klinische Neurophysiologie und Funktionelle Bildgebung e.V.
(Rated as best Symposium out of 55)
Title "Instantaneous EEG excitability states of stroke patients' ipsilesional and contralesional hemispheres probed by TMS"
Frankfurt (Germany)

19 October 2023
Invited talk - Cutting Gardens 2023
Title "Comparison of different TMS-EEG cleaning pipelines: Advantages, Issues and Challenges"
Genova (Italy)

15 June 2023
Invited talk – Brain Networks and Plasticity Lab (Hertie Institute for Clinical Brain Research)
Title "EEG-phase dependent approach for the analysis of TMS-EEG stroke data"
Tübingen (Germany)

2 February 2023
Invited talk – Institute for Biomagnetism and Biosignalanalysis (IBB)
Title "Brain state-dependent TMS in stroke patients"
Münster (Germany)

28 August – 1 September - 2022
BIOMAG 2022 – International Conference on Biomagnetism
Birmingham (UK)

19-23 June 2022
OHBM 2022 – Organization for Human Brain Mapping
Glasgow (UK)

24-28 January 2022
E.W.C.N - European Workshop on Cognitive Neuropsychology
Bressanone (Italy)

27 October 2021
Invited talk - **Department of neurorehabilitation. Hospital of Vipiteno-Sterzing**
Title: "Individual brain reorganization patterns after a stroke"
Vipiteno (Italy)

24-26 October 2019
RAW Rovereto Attention Workshop, 2019
Trento (Italy)

2-4 May 2019
CAOs - Rovereto Workshop on Concepts, Actions and Objects
Trento (Italy)

6-7 December 2018
TBS CNW - Transcranial Brain Stimulation in Cognitive Neuroscience Workshop
Trento (IT)

Languages

	LISTENING	READING	SPEAKING	WRITING
Italian	Native speaker	Native speaker	Native speaker	Native speaker
English	C2	C2	C2	C2
French	A2	A2	A2	A2

Other information	Driving licence B. July 2010 English Language Course at Eastbourne College Old Wish Road, Eastbourne, East Sussex, BN21 4JY February – April 2015 Course in “Film analysis and criticism” Pigrecoemme – Academia of Cinema and Photography Napoli (Italy)