Martina G. Vilas

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ABOUT ME

I am a computer science doctoral researcher with a background in cognitive neuroscience. Working at the intersection of these topics, my research focuses on reverse engineer the cognitive capacities of AI models and improve their alignment with human cognition. I also have a passion for developing and contributing to open source projects related to my field of work.

EDUCATION

Doctoral degree in Computer Science | ***Goethe University*** — ongoing, Germany
Thesis topic in the field of inner interpretability of AI models. Co-supervised by Prof. Gemma Roig and Prof. David Poeppel.
- Passed qualifying exam in the topics of *Theoretical Computer Science*, *Software Engineering* and *Hardware*.

Licenciatura in Psychology, with a focus on Cognitive Neuroscience | ***Favaloro University*** — 2012 – 2017, Argentina
5.5-year study plan, equivalent to Bachelor + Master's degree
- Grade: 9.48/10. First class with Honours Degree.
- Thesis grade: 10/10

RESEARCH EXPERIENCE

Researcher | ***CVAI Lab & Ernst Strüngmann Institute (in cooperation with Max-Planck Society)*** — 2021 – present, Germany
Studying how AI systems abstract semantic knowledge from unimodal and multimodal sources of information.

Researcher | ***Max-Planck-Institute AE*** — 2018 – 2021, Germany
Studied the temporal dynamics and format of neural representations underlying schema-retrieval, episodic-memory, and predictive processing mechanisms, using machine learning methods and representational similarity analysis.

Researcher | ***COCUCO Lab, Physics Department, University of Buenos Aires*** — 2017 – 2018, Argentina
Quantified brain states of reduced consciousness (e.g. anesthesia, sleep) with machine learning methods.

Intern | ***LPEN, Institute of Cognitive and Translational Neuroscience (INCyT)*** — 2014 – 2016, Argentina
Investigated the neural dynamics of bilingualism with time-frequency analysis.

ACADEMIC PUBLICATIONS (selected)

(denotes equal contribution)*

M.G. Vilas, T. Schaumlöffel and G. Roig (2023). Analyzing vision transformers for image classification in class embedding space. *37th Conference on Neural Information Processing Systems (NeurIPS 2023)*.

A.T. Gifford, B. Lahner, S. Saba-Sadiya, **M.G. Vilas**, A. Lascelles, A. Oliva, K. Kay, G. Roig and R.M. Cichy (2023). The

algonauts project 2023 challenge: How the human brain makes sense of natural scenes. *arXiv preprint arXiv:2301.03198*.

T. Schaumlöffel, **M.G. Vilas** and G. Roig (2023). Peacs: Prefix encoding for auditory caption synthesis. *DCASE2023 Challenge*.

D. Bersch, K. Dwivedi, **M. Vilas**, R. M. Cichy, and G. Roig (2022). Net2Brain: A Toolbox to compare artificial vision models with human brain responses. *arXiv preprint arXiv:2208.09677*. Accepted at CCN 2022.

M.G. Vilas, R. Auksztulewicz, L. Melloni (2021). Active Inference as a Computational Framework for Consciousness. *Review of Philosophy and Psychology*, 1-20.

M.G. Vilas, L. Melloni (2020). A challenge for predictive coding: Representational or experiential diversity? *Behavioral and Brain Sciences, 43*.

M.G. Vilas, L. Melloni (2019). Schema- and episodic-based predictions during visual narrative perception. *The Predictive Brain Conference*, Marseille, France.

C. Pallavacini*, **M.G. Vilas***, M. Villarreal, F. Zamberlan, S. Muthukumaraswamy, D. Nutt, R. Carhart-Harris, E. Tagliazucchi (2019). Spectral signatures of serotonergic psychedelics and glutamatergic dissociatives. *NeuroImage, 200*, 281-291.

M.G. Vilas, M. Santilli, E. Mikulan, F. Adolfi, M. Martorell Caro, F. Manes, E. Herrera, L. Sedeño, A. Ibáñez, A. M. García (2019). Shakespearean tropes and the non-native reader: Age of L2 acquisition modulates neural responses to functional shifts. *Neuropsychologia, 124*, 79-86.

F. Cavanna*, **M.G. Vilas***, M. Palmucci*, E. Tagliazucchi (2018). Dynamic functional connectivity and brain metastability during altered states of consciousness. *NeuroImage, 180*, 383-395.

M. Santilli*, **M.G. Vilas***, E. Mikulan, M. Martorell Caro, E. Muñoz, L. Sedeño, A. Ibáñez, A.M. García (2018). Bilingual memory, to the extreme: Lexical processing in simultaneous interpreters. *Bilingualism: Language and Cognition*, 1-18.

TALKS & TUTORIALS (selected)

S. Saba-Sadiya, **M.G. Vilas**, A. Gifford (2023). Algonauts & Net2Brain Hackathon. *CNN 2023*, Oxford.

M.G. Vilas (2023). Net2Brain: A toolbox to compare artificial deep neural networks with human brain responses. *Data Science Week 2023*, Frankfurt am Main.

M.G. Vilas (2021). Introduction to machine learning and data visualization with Python. *OHBM BrainHack*, online.

M.G. Vilas (2021). Good practices for reproducible and open science. *EMBL*, online.

M.G. Vilas (2021 & 2020). Computational reproducibility: Best practices outlined by The Turing Way. Presented at *University College London*, *University of Leicester*, and *Brainhack Donostia*. `http://doi.org/10.5281/zenodo.4269795`.

M.G. Vilas (2021). Evaluating the reproducibility of deep learning research in cognitive computational neuroscience. *LXAI Social at ICLR 2021*, online. `http://doi.org/10.5281/zenodo.4740053`

M.G. Vilas, S. Henin, C. Ranganath, L. Melloni (2021). Schema- and episodic-based predictions during visual narrative perception. *CNS 2021*, online.

M.G. Vilas, K. Whitaker (2021). Why you need a reproducible computational environment and how Binder can help. *Boost your Research Reproducibility with Binder Workshop* at *3rd SSI Research Software Camp*, online. `http://doi.org/10.5281/zenodo.4573146`

M.G. Vilas, M. Sharan, K. Whitaker (2020). The Turing Way: A guide to reproducible, ethical and collaborative research practices. *LiveMEEG*, online. `http://doi.org/10.5281/zenodo.4075439`

HONORS & AWARDS

Open Science SIG Fellowship | *Organization for Human Brain Mapping (OHBM)* 2021
Travel Grant | *EuroScipy* 2019
Ph.D. Scholarship | *National Scientific and Technical Research Council (CONICET)* 2017
Academic Excellence Scholarship | *Favaloro University* 2016
Academic Merit Award | *Santander Rio Bank* 2016, 2014 & 2013

MENTORING

Google Summer of Code | *Project Mentor* 2021
Outreachy | *Project Mentor* 2021
Open Life Science Program | *Mentor & Expert* 2020 & 2021
Book Dash of The Turing Way | *Mentor / Helper* 2020

TEACHING

Guest Speaker | *Computer Vision Seminar* | Goethe University 2024
Teaching Assistant | *Introduction to Machine Learning with scikit-learn* | Hackathon - Organization for Human Brain Mapping 2021
Instructor | *Creating a Jupyter Book with The Turing Way* | JupyterCon 2020 2020
Teaching Assistant | *Experimental Psychology* | Favaloro University 2014

OPEN-SCIENCE/OPEN-SOURCE CONTRIBUTIONS

Community Lead | *Cohere for AI* 2024 - pres.
Core Developer | *net2brain* 2021 - pres.
Open Source Contributor | *scikit-learn, sktime, pandas, jupyter-book, net2brain* 2019 - pres.
Core Developer | *The Turing Way* 2020 - 2021
Project Lead | *Open Life Science Program* 2021
Co-organizer | *pandanistas* 2020

SERVICES

Academic

Co-Chair Minisymposium on Neuroscience and Biology | *SciPy 2021 Conference* 2021
Volunteer | *EuroSciPy 2019 Conference* 2019
Reviewer | *ACL, EMNLP, CVPR, Nature Reviews Neuroscience, Journal of Open Source Software, Current Biology, Frontiers in Human Neuroscience, among others* -

Community

Code of Conduct Committee Member | *sktime Python Software Package* 2020 – 2022
PhD representative | *Max Planck Institute AE* 2019 – 2021