










Demetrio Ferro

Curriculum Vitae

Personal information

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Current position

PostDoctoral Researcher

Field of Expertise: Computational & Cognitive Neuroscience, Information Theory.

I work in the group of Theoretical and Computational Neuroscience (TCN), within the Center for Brain and Cognition (CBC), Department of Engineering of Information and Communication Technologies (ETIC), at the University Pompeu Fabra (UPF).

Education and skills

Scientific Background Academic knowledge of cognitive neuroscience with focus on neurophysiological interactions and functional connectivity at intracortical level. General background in structural/functional neuroanatomy and physiology of cognitive neural functions.

Languages Italian: *C2*; English: *C1*; French: *B2*; Spanish: *B2* (CEFR Levels).

Software skills MATLAB, MATLAB GUI, Python, Jupyter Notebook, Conda, Rstudio, Github, Microsoft Visual Studio, Eclipse IDE, CodeBlocks, Netbeans, Microsoft Office Suite, TexMaker, Adobe Photoshop, Adobe Illustrator, Inkscape, GNU Emacs, Vi/Vim.

Software languages MATLAB, R, Python, Ruby, JAVA, C, C++, HTML, CSS, Javascript, VHDL, SQL, BASH, L^AT_EX, **O.S.** Unix, Windows. **DataBase** MySQL, Oracle.

Certificates Coursera - Medical Neuroscience, Prof. Leonard E. White, Duke University;
Coursera - Machine Learning, Prof. Andrew Ng, Stanford University.

Repository Data and code from published material and related tools developed: [Gin G-Node](#).

Academic path

2016-2019 **Ph.D. Degree in Cognitive Neuroscience**,
University of Trento, Rovereto, Italy

Thesis: **Effects of attention between cortical layers and cortical areas V1 and V4**
Advisors: Prof. S. Panzeri (*Rovereto, Italy*), Prof. A. Thiele (*University of Newcastle, UK*).
Published work: Ferro, IRIS 2020, Ferro et al., PNAS 2021.

2013-2015 **Master Degree in Telecommunication Engineering** (cum laude),
Polytechnic of Turin, Turin, Italy

Thesis: **Nearest Neighbour Search using binary clustered Neural Networks**
Advisors: Prof. G. Montorsi (*Polytechnic of Turin, Turin, Italy*),
Prof. C. Berrou and Prof. V. Gripon (*Télécom Bretagne, Brest, France*).
Published work: Ferro et al., IJCNN 2016.

2009-2013 **Bachelor Degree in Computer Engineering,**
Università degli Studi di Salerno, Fisciano, Italy

Thesis: **Information Flows hidden in network traffic: analysis of embedding policies.**
Advisors: Prof. S. Marano and Prof. V. Matta (*University of Salerno, Fisciano, Italy*).
Analytical and simulated transfer capacity of information embedded in cover traffic [source].

Research path

Oct 2020 **PostDoctoral researcher - Universitat Pompeu Fabra,**
current *Dept. of Engineering and Information Technologies (ETIC),
Teoretical Cognitive Neuroscience (TCN), Barcelona, Spain*
Lab head: Prof. R. Moreno-Bote.

Nov 2019 **Internship at CNCS - Italian Institute of Technology,**
Aug 2020 *Center for Neuroscience and Cognitive Systems, Rovereto, Italy*
Lab head: Prof. S. Panzeri.

Apr 2016 **Internship at CNCS - Italian Institute of Technology,**
Sept 2016 *Center for Neuroscience and Cognitive Systems, Rovereto, Italy*
Lab head: Prof. S. Panzeri.

Apr 2015 **M.Sc. Thesis at NeuCod - Télécom Bretagne,**
Sept 2015 *Neural Coding group, Brest, France*
Advisor: Prof. C. Berrou, Co-advisor: Prof. V. Gripon.

Oct 2012 Mar **B.Sc. Thesis at CoRiTel - Ericsson,**
2013 *Research Consortium on Telecommunications, Fisciano, Italy*
Advisors: Prof. S. Marano and Prof. V. Matta.

Teaching & supervising

2025 **Chair of the Bachelor Degree theses dissertations committee,**
Universitat Pompeu Fabra, June 25th 2025.

2024 **Chair of the Bachelor Degree theses dissertations committee,**
Universitat Pompeu Fabra, July 15-17th 2024.

Jan-July 2024 **Thesis supervisor, Student: Pau Boncompte Carre,**
Universitat Pompeu Fabra, Faculty of Biomedical Engineering.

Sept-Nov 2023 **Internship supervisor, Student: Marcel Socoró Garrigosa,**
Universitat Pompeu Fabra, Faculty of Biomedical Engineering.

July-Aug 2023 **Internship supervisor, Student: Pau Garriga Marsans,**
Universitat Pompeu Fabra, Faculty of Biomedical Engineering.

2022-2023 **Scientific Communication, (3 ECTS),**
Universitat Pompeu Fabra, Faculty of Biomedical Engineering.

2021-2022 **Scientific Communication, (3 ECTS),**
Universitat Pompeu Fabra, Faculty of Biomedical Engineering.

2022 **Chair of the Master Degree theses dissertations committee,**
Universitat Pompeu Fabra, July 11th 2022.

Sept 2020 **Thesis supervisor, Student: Anna Rifé Mata,**
Feb 2021 *Universitat Pompeu Fabra, Faculty of Biomedical Engineering.*

Publications

- bioRxiv 2025 **D. Ferro**, H. Azab, B. Hayden and R. Moreno-Bote, “*Accumulation of virtual tokens towards a jackpot reward enhances performance and value encoding in dorsal anterior cingulate cortex*”, bioRxiv 2025. DOI: [10.1101/2025.03.03.640771](https://doi.org/10.1101/2025.03.03.640771).
- CCN 2025 **D. Ferro**, T. Yang, R. Moreno-Bote, “*A closed-loop model for the coordination of gaze control and decision-making*”, Cognitive, Computational Neuroscience (CCN), 2025; PDF: [CCN2025](#).
- CCN 2025 **D. Ferro**, H. Azab, B. Y. Hayden, R. Moreno-Bote, “*Decision-making reference point biases in the dorsal anterior cingulate cortex*”, CCN, 2025; PDF: [CCN2025](#).
- Nature Comm.s 2024 **D. Ferro**, T. Cash-Padgett, M. Z. Wang, B. Hayden and R. Moreno-Bote, “*Gaze-centered gating, reactivation, and reevaluation of economic value in orbitofrontal cortex*”, Nature Communications, 15(6163), July 2024. DOI: [10.1038/s41467-024-50214-2](https://doi.org/10.1038/s41467-024-50214-2).
- CCN 2023 **D. Ferro**, Anna Rifé, T. Cash-Padgett, M. Z. Wang, B. Hayden and R. Moreno-Bote, “*The role of gaze for value encoding and recollection in orbitofrontal cortex*”, Conference on Cognitive Computational Neuroscience, Oxford, August 2023. DOI: [10.32470/CCN.2023.1122-0](https://doi.org/10.32470/CCN.2023.1122-0).
- HPB KG 2023 **D. Ferro**, B. Hayden and R. Moreno-Bote, “*Model of gaze centred activation and reactivation of value encoding in orbitofrontal cortex*”, Human Brain Project Knowledge Graph, 2023.
- bioRxiv 2023 **D. Ferro**, T. Cash-Padgett, M. Z. Wang, B. Hayden and R. Moreno-Bote, “*Gaze-centered gating and re-activation of value encoding in orbitofrontal cortex*”, bioRxiv, April 2023. DOI: [10.1101/2023.04.20.537677](https://doi.org/10.1101/2023.04.20.537677).
- PNAS 2021 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri and A. Thiele, “*Directed information exchange between cortical layers in macaque V1 and V4 and its modulation by attention.*”, Proceedings of the National Academy of Sciences, 118(12), March 2021. DOI: [10.1073/pnas.2022097118](https://doi.org/10.1073/pnas.2022097118).
- bioRxiv 2020 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri and A. Thiele, “*Directed information exchange between cortical layers in macaque V1 and V4 and its modulation by attention.*”, bioRxiv, June 2020. DOI: [10.1101/2020.06.09.142190](https://doi.org/10.1101/2020.06.09.142190).
- IRIS 2020 **D. Ferro**, “*Effects of attention on visual processing between cortical layers and cortical areas V1 and V4.*”, PhD Thesis published in Academic Institutional Research Information System (IRIS), Dec. 2019. DOI: [10.15168/11572_246290](https://doi.org/10.15168/11572_246290).
- IJCNN 2016 **D. Ferro**, V. Gripon, and X. Jiang. “*Nearest neighbour search using binary neural networks.*”, International Joint Conference on Neural Networks (IJCNN). IEEE, July 2016. DOI: [10.1109/IJCNN.2016.7727873](https://doi.org/10.1109/IJCNN.2016.7727873).

Conferences & Talks

- CCN 2025 **D. Ferro**, T. Yang, R. Moreno-Bote, “*A closed-loop model for the coordination of gaze control and decision-making*”, Cognitive, Computational Neuroscience, August 2025 (Amsterdam, Netherlands). (Poster)
- CCN 2025 **D. Ferro**, H. Azab, B. Y. Hayden, R. Moreno-Bote, “*Decision-making reference point biases in the dorsal anterior cingulate cortex*”, CCN 2025, August 2025 (Amsterdam, Netherlands). (Poster)
- CASES 2025 **D. Ferro**, “*Visual attention and cognitive control of intentions*”, Citizen science And SciEntific reSearch (CASES), EUTOPIA Impact and Dissemination, July 2025 (Barcelona, Spain). (Talk)
- CRM 2025 **D. Ferro**, H. Azab, B. Y. Hayden, R. Moreno-Bote, “*Accumulation of virtual tokens towards a jackpot reward enhances performance and value encoding in dorsal anterior cingulate cortex*”, Centre de Recerca Matemàtica, April 2025 (Barcelona, Spain). (Talk)

- UvA 2024 **D. Ferro**, “*From attention to intention: how covert and overt gaze behavior implements the selective encoding of reward variables*”, University of Amsterdam, Oct. 2024 (Netherlands). (Talk)
- ICT 2024 **D. Ferro**, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Economic decision-making in the brain: how does gaze relate to the activity of orbitofrontal cortex neurons?*”, International Conference on Thinking, June 2024 (Milan, Italy). (Talk)
- ICT 2024 R. Moreno-Bote, **D. Ferro**, J. Ramirez-Ruiz, “*Theories of intrinsically motivated behavior: comparing Empowerment, Free Energy Principle and Maximum Occupancy Principle*”, International Conference on Thinking, June 2024 (Milan, Italy). (Poster)
- CCN 2023 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*The role of gaze for value encoding and recollection in orbitofrontal cortex*”, Cognitive, Computational Neuroscience, August 2023 (Oxford, United Kingdom). (Poster)
- HBP WP2 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, 2023 (Talk) “*Gaze-centered gating and re-activation of value encoding in orbitofrontal cortex*”, Human Brain Project (HBP) Work Package 2 (WP2) Meeting, June 2023 (Barcelona, Spain).
- HPB Summit 2023 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, 2023 (Poster) “*Looking at previous cue sites reactivates value coding for serial evaluation in orbitofrontal cortex*”, Human Brain Project Summit 2023, March 2023 (Marseille, France).
- MSBFIINE **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, 2022 (Talk) “*Recalling what was there: Eye position in reward gambling and the role of orbito-frontal cortex in encoding the value of visually cued offers*”, MSBFIINE, Dec 2022 (Varenna, Italy).
- Barccsyn 2022 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, (Poster) “*Imagining what was there: Looking at an absent offer location modulates neural response in orbito-frontal cortex.*”, Barccsyn, May 2022 (Barcelona, Spain).
- Cosyne 2022 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, (Poster) “*Imagining what was there: Looking at an absent offer location modulates neural response in orbito-frontal cortex.*”, Cosyne, March 2022 (Lisbon and Cascais, Portugal).
- CoReDeM **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, 2021 (Talk) “*Imagining what was there: Looking at an absent offer location modulates neural response in orbito-frontal cortex.*”, CoReDeM (Human Brain Project, WP2), Nov. 2021 (Barcelona, Spain).
- SINC² 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, (Poster) “*Is your gaze your aim? Eye position in reward gambling [...] in encoding the value of visually cued offers.*”, Spanish Network for the Interaction between Computational and Cognitive Neuroscience (SINC²), Nov. 2021 (Lleida, Spain).
- SENC 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, (Poster) “*Is your gaze your aim? Eye position in reward gambling [...] in encoding the value of visually cued offers.*”, Spanish Society for Neuroscience (SENC), Nov. 2021 (Lleida, Spain).
- Barccsyn 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, (Poster) “*Is your gaze your aim? Eye position in reward gambling and the role of orbitofrontal cortex in encoding the value of visually cued offers.*”, Barcelona Computational, Cognitive, Systems Neuroscience (BARCCSYN), July 2021 (Barcelona, Spain).
- INT 2020 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri, A. Thiele, (Talk) “*Effects of attention on Granger causal interactions between cortical layers and cortical areas V1 and V4*”, Institute of Neuroscience of Timone (INT), Feb. 2020 (Marseille, France).
- SfN 2019 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri, A. Thiele, (Poster) “*Effects of attention on Granger causal interactions between cortical layers and cortical areas V1 and V4*”, Annual Meeting of the Society for Neuroscience (SfN), 2019 (Chicago, Illinois, USA).

- Unitn 2019 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri, A. Thiele, “*Effects of attention on visual processing between cortical layers and cortical areas V1 and V4.*”, PhD Doctoral student Day at the University of Trento, 2019 (Rovereto, Italy).
- Unitn 2017 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri, A. Thiele, “*A non-linear Granger causality approach to studying interactions between cortical layers in visual areas V1 and V4.*”, University of Trento, 2017 (Rovereto, Italy).

Attended Events

- 2024–ongoing **Neuro Chats**: Centre de Recerca Matemàtica (CRM) meetings among pre- and postdoctoral researchers based or visiting Barcelona. 2024–ongoing (Barcelona, Spain).
- 2020–ongoing **CBC Seminars**: periodic meetings with international invited speakers at the Center for Brain and Cognition (CBC), October 2020–ongoing (Barcelona, Spain).
- 2025 **Barcelona Computational, Cognitive and Systems Neuroscience (Barccsyn)**, May 2025 (Barcelona, Spain). [programme]
- 2024 **PostDoc Day in Biomedical Research**, organized by the Instituto de Recerca Biomèdica (IRB), Vall d’Hebron Institute of Oncology (VHIO) and the Societat Catalana de Biologia (SCB), November 2024 (Barcelona, Spain). [programme] [certificate]
- Citizen science And SciEntific reSearch (CASES)**, EUTOPIA Impact and Dissemination, September 2024 (Barcelona, Spain). [certificate]
- Barcelona Computational, Cognitive and Systems Neuroscience (Barccsyn)**, May 2024 (Barcelona, Spain). [programme]
- 2023 **Barcelona Computational, Cognitive and Systems Neuroscience (Barccsyn)**, May 2023 (Barcelona, Spain). [programme]
- Anatomy and function of the prefrontal cortex across species (Human Brain Project)**, March 2023 (Paris, France). [programme]
- Consortium of Research on Decision Making (CoReDeM)** (Human Brain Project, Work Package 2), July 2022 (Paris, France). [programme]
- 2018 **Neural Coding Conference**, Univ. of Turin, Sept. 2018 (Turin, Italy). [programme]
- 2017 **Slow Dynamics**: Experimental and Theoretical Analysis of Cortical Dynamics Workshop, Human Brain Project, September 2017 (Rovereto, Italy). [programme]
- 2016–2020 **Brown Bag**: lunchtime, weekly meetings with local scientists and visitors at the Center for Mind/Brain Sciences, April 2016–February 2020 (Rovereto, Italy).

Organized Events

- 2024 **10th retreat of the Barccsyn community**, Nov. 2024 (St. Feliu de Guixols, Spain).
- 2022 **7th retreat of the Barccsyn community**, Feb. 2022 (St. Feliu de Guixols, Spain).
- 2021 **CoReDeM Consortium Meeting** (HBP, WP2), November 2021 (Barcelona, Spain).
- 2018 **Lab Fair**: Exhibition of the research work of the Neural Coding Lab at the Center for Mind/Brain Sciences, November 2018 (Rovereto, Italy).
- 2017–2018 **Brown Bag Meetings**: lunchtime, weekly meetings with local and visiting scientists at the Center for Mind/Brain Sciences, March 2017–April 2018 (Rovereto, Italy).

Fundings

Bial 2022 *Gaze-centered decision making*. Grants 2022, Bial Foundation cloud (*output report*).

Peer Reviews

2024-2025 1 Verified review for *Nature Communications* [ORCID].
7 Verified reviews for *PLOS Computational Biology* [Web of Science].
1 Verified review for *Qeios* [Web of Science].

International Collaborations

2017–2021 Collaboration with the experimental lab of **Prof. A. Thiele** at the University of Newcastle, UK. Analysis of laminar-specific effects of attention on inter- and intra-areal directed information flows within visual areas V1 and V4 (Ferro et al., PNAS 2021).

Hayden Lab
2021–ongoing Analysis of neural data related to decision-making tasks in the lab of **Prof. B. Hayden** at the Baylor College of Medicine, Houston, USA. (Ferro et al., CCN 2023; Ferro et al., Nature Communications 2024; Ferro et al., CCN 2025; Ferro et al., bioRxiv 2025).

HBP WP2
2022–2023 Data-driven and validated multiscale computational models and neuromorphic implementations [(D17 - SGA3 M42) report]. Model of gaze-centred activation of value encoding in orbitofrontal cortex [KG EBRAINS]. Co-funded by the European Union. I took part in the Consortium of Research on Decision Making (CoReDeM), bringing together experts of theoretical (PIs: Rubén Moreno-Bote and Ignasi Cos from Universitat Pompeu Fabra; Alain Desthèze from CNRS Paris Saclay) and experimental neuroscience (PIs: Stefano Ferraina from Sapienza University of Rome and Tom Theys from KU Leuven, Belgium).

Gaze2Decision
2024–ongoing Neural network circuitry models for gaze-to-decision coordination, collaborating with the lab of **Dr. T. Yang** at the NYU-ECNU in Shanghai, China. (Ferro et al., CCN 2025).

Vision4Action
2024–ongoing Analysis of neural data collected during a hand landing task for the coordination of visual and motor functions (under development). Joint venture with the lab of **Prof. S. Grün** (Institute for Advanced Simulations, Jülich, Germany) and the lab of **Dr. T. Brochier** (Institut de Neurosciences de la Timone, Marseille, France).