










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 Cognitive and computational neuroscience, with emphasis on neural information encoding and neurophysiological interactions at the laminar level. Academic training in information theory, advanced statistical modelling, signal processing, detection theory, and data analysis.

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 2019; Ferro et al., PNAS 2021.

2013-2015 **Master's 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's 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 study of information transfer capacity under cover traffic [source].

Research path

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

Dec 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,**
Sep 2016 *Center for Neuroscience and Cognitive Systems, Rovereto, Italy*
Lab head: Prof. S. Panzeri.

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

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

Teaching & Mentorship

2025 **Chair of the Bachelor's Degree thesis committee,**
Universitat Pompeu Fabra, June 25th 2025.

2024 **Chair of the Bachelor's Degree thesis committee,**
Universitat Pompeu Fabra, July 15-17th 2024.

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

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

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

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

2022 **Chair of the Master's Degree thesis committee,**
Universitat Pompeu Fabra, July 11th 2022.

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

Sep 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) (in peer-review).
- 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 2019 **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 (CCN), August 2025 (Poster) (Amsterdam, Netherlands).
- CCN 2025 **D. Ferro**, H. Azab, B. Y. Hayden, R. Moreno-Bote, “*Decision-making reference point biases in the dorsal anterior cingulate cortex*”, CCN, August 2025 (Poster) (Amsterdam, Netherlands).
- CASES 2025 **D. Ferro**, “*Visual attention and cognitive control of intentions*”, Citizen science And SciEntific reSearch (CASES), EUTOPIA Impact and Dissemination, July 2025 (Talk) (Barcelona, Spain).
- 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 (CRM), April 2025 (Talk) (Barcelona, Spain).

- UvA 2024 **D. Ferro**, “*From attention to intention: how covert and overt gaze behavior implements the selective encoding of reward variables*”, Universiteit van 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 (ICT), 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 (ICT), June 2024 (Milan, Italy). (Poster)
- CIMeC 2023 **D. Ferro**, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*The role of gaze for value encoding and recollection in orbitofrontal cortex*”, R. Bottini Lab, Centro Interdipartimentale Mente Cervello (CIMeC), Nov. 2023 (Rovereto, Italy). (Talk)
- 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 (CCN), August 2023 (Oxford, UK). (Poster)
- HBP WP2 2023 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*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). (Talk)
- HPB Summit 2023 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Looking at previous cue sites reactivates value coding for serial evaluation in orbitofrontal cortex*”, Human Brain Project Summit, March 2023 (Marseille, France). (Poster)
- MSBFIINE 2022 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*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). (Talk)
- Barccsyn 2022 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Imagining what was there: Looking at an absent offer location modulates neural response in orbito-frontal cortex.*”, Barcelona Cognitive, Computational Systems Neuroscience (Barccsyn), May 2022 (Spain). (Poster)
- Cosyne 2022 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Imagining what was there: Looking at an absent offer location modulates neural response in orbito-frontal cortex.*”, Cognitive Systems Neuroscience (Cosyne), March 2022 (Lisbon and Cascais, Portugal). (Poster)
- CoReDeM 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Imagining what was there: Looking at an absent offer location modulates neural response in orbito-frontal cortex.*”, Consortium of Research in Decision Making (CoReDeM; HBP, WP2), Nov. 2021 (Barcelona, Spain). (Talk)
- SINC² 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Is your gaze your aim? Eye position in reward gambling and the role of orbitofrontal cortex in encoding the value of visually cued offers.*”, Spanish Network for the Interaction between Computational and Cognitive Neuroscience (SINC²), Nov. 2021 (Lleida, Spain). (Talk)
- SENC 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*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). (Poster)
- Barccsyn 2021 **D. Ferro**, A. Rifé-Mata, T. Cash-Padgett, M. Z. Wang, B. Y. Hayden, R. Moreno-Bote, “*Is your gaze your aim? Eye position in reward gambling and the role of orbitofrontal cortex in encoding the value of visually cued offers.*”, Barccsyn, July 2021 (Barcelona, Spain). (Poster)

- INT 2020 **D. Ferro**, J. van Kempen, M. Boyd, S. Panzeri, A. Thiele, “*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, “*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).
- SfN 2017 A. Thiele, **D. Ferro**, M. Boyd, S. Panzeri, “*Layer dependent attentional modulation of broad and narrow spiking cells in primate V1.*”, Annual Meeting of the Society for Neuroscience (*SfN*), 2017 (Washington, DC, USA).

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 **Annual meeting of Barccsyn** (Barcelona Cognitive, Computational and Systems Neuroscience Community), May 2025 (Barcelona, Spain). [programme]
- 2024 **PostDoc Day in Biomedical Research**, organized by the Instituto de Recerca Biomedica (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]
- Annual meeting of Barccsyn** (Barcelona Cognitive, Computational and Systems Neuroscience Community), May 2024 (Barcelona, Spain). [programme]
- Anatomy and function of the prefrontal cortex across species** (Human Brain Project), March 2023 (Paris, France). [programme]
- 2022 **Meeting of CoReDeM** (Consortium of Research on Decision Making; Human Brain Project, Work Package 2), July 2022 (Paris, France). [programme]
- 2018 **Neural Coding Conference**, Univ. of Turin, Sep. 2018 (Turin, Italy). [programme]
- 2017 **SloW-Dyn**: Experimental and Theoretical Analysis of Cortical Dynamics Workshop, Human Brain Project, September 2017 (Rovereto, Italy). [programme]
- 2016–2020 **Brown Bag Seminars**: weekly, with local and visiting scientists at the Centro Interdipartimentale Mente/Cervello (CIMEC), Apr. 2016 – Feb. 2020 (Rovereto, Italy).

Organized Events

- 2024 **10th retreat of the Barccsyn community**, Nov. 2024 (Sant Feliu de Guixols, Spain).
- 2022 **7th retreat of the Barccsyn community**, Feb. 2022 (Sant Feliu de Guixols, Spain).

- 2021 **Meeting of CoReDeM** (Consortium of Research on Decision Making; Human Brain Project, Work Package 2), November 2021 (Barcelona, Spain). [programme]
- 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 Seminars:** lunchtime, weekly meetings with local and visiting scientists at the Center for Mind/Brain Sciences, March 2017–April 2018 (Rovereto, Italy).

Funding

- Bial 2022 **Gaze-centered decision making.** Bial Foundation 2022, Ref: PT/FB/BL-2022-106. This work was devoted to the study of the encoding of reward-based value in the orbitofrontal cortex and the role of gaze position in modulating its gating and reactivation in decision-making tasks (Ferro et al., CCN 2023, Ferro et al., Nature Communications 2024).

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

- Gaze2Decision 2024–ongoing Collaboration with the experimental lab of Dr. T. Yang at the NYU-ECNU in Shanghai, China. Circuit modelling of mutually inhibiting networks of neural units for the interaction between gaze direction and decision formation (*Ferro et al., CCN 2025*).
- Vision4Action 2024–ongoing Joint venture with the lab of Prof. S. Grün (Institute for Advanced Simulations, Jülich, Germany) and the experimental lab of Dr. T. Brochier (Institut de Neurosciences de la Timone, Marseille, France). Analysis of neural data collected during a hand landing task for the coordination of visual and motor functions (under development).
- Prof. Hayden 2021–ongoing Collaboration with the experimental research lab of Prof. B. Hayden at the Baylor College of Medicine, Houston, USA. Analysis of the neural encoding of reward-based values and the role of gaze position in decision-making tasks (*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 Human Brain Project (HBP), Work Package 2 (WP2), Co-funded by the European Union. Collaboration with the Consortium of Research on Decision Making (CoReDeM), bringing together theoretical (P.I.s: R. Moreno-Bote and I. Cos from Universitat Pompeu Fabra, Barcelona; A. Destexhe from Centre National de la Recherche Scientifique Paris Saclay) and experimental (P.I.s: S. Ferraina from Sapienza University of Rome and T. Theys from KU Leuven, Belgium) researchers. "*Data-driven and validated multiscale computational models and neuromorphic implementations*" [Report: *D17 - SGA3 M42*] and "*Model of gaze-centred activation of value encoding in orbitofrontal cortex*" [*Knowledge Graph EBRAINS*].
- Prof. Thiele 2017–2021 Collaboration with the experimental group 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 brain areas V1 and V4 (*Ferro, IRIS 2019; Ferro et al., PNAS 2021*).