

Ignacio Echegoyen

Neuroscience Researcher



Jan. 03, 1993 (Madrid, Spain)



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About me

I've always wanted to be a therapist, but at some point during my degree, I realized that learning about the brain could be a fantastic adventure. Here I am, studying a PhD in neuroscience, without any hint about my next step. I love jazz music, reading and sports. I have an identical twin, and every time I can, I grab my backpack and go to travel abroad.

Interests

Theoretical statistics, nonlinear dynamics, and computational Neuroscience. As a neuroscientist, I'm amazed by the fact that from a bunch of -simple (whatever that means) - interconnected neurons, mind and self-consciousness arise.

Skills

I can code reasonably well, mainly in Matlab. My knowledge of maths is quite basic, but I'm working on it. I'm used to scientific literature in the fields of psychology, statistics, information theory, complex systems and theoretical, computational and clinical neuroscience. I feel confident writing papers and reports in \LaTeX . If I had to highlight one skill above the others, it would be my ability to adapt to new knowledge, techniques of analyses and programming languages. After all, in the last four years I've transitioned from psychology to statistics to neuroscience and complex systems.

Education

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|------------|---|--|
| since 2016 | Ph.D. in Biomedical Engineering | Technical University, Madrid |
| | <i>Functional Brain Networks: Multilayer organization and Cognitive Impairment.</i> | |
| | Supervisor: Prof. Javier Martín Buldú Laboratory of Biological Networks, Centre for Biomedical Technology (CTB) | |
| 2015/17 | M.Sc. [9.18/10] | Autonomous University, Madrid |
| | Methodology in Behavioral and Health Sciences | |
| 2011/15 | B.Sc. [8.74/10] | Comillas Pontifical University, Madrid |
| | Degree in Psychology | |
| 2011/15 | Certificate in English, C1 | Language Institute, Madrid |
| | Annual courses (weekly basis) | |
| 2004/11 | Certificate in Advanced English | British Council School, Madrid |
| | Annual courses (weekly basis) | |

Publications and Internships

2019/20

Antequera, D.R., Garrido D., Echegoyen, I., Resta R., (2020). Asymmetries in football: The pass-goal paradox. *submitted to Symmetry*.

Herrera-Diestra, J.L, Echegoyen, I., Martínez, J.H., Garrido, D., Busquets, F., Seirul.lo, F., Buldú, M.J., (2020). Pitch networks reveal organizational and spatial patterns of Guardiola's F.C. Barcelona. *submitted to Chaos, Solitons and Fractals*.

Echegoyen, I., López-Sanz, D., Martínez, J.H., Maestú, F., Buldú, M.J., (2020). Permutation Entropy and Statistical Complexity in Mild Cognitive Impairment and Alzheimer's Disease: An Analysis Based on Frequency Bands. *Entropy*. <https://doi.org/10.3390/e22010116>

Referee role for Brain Imaging and Behavior, Brain Topography and Network Neuroscience.

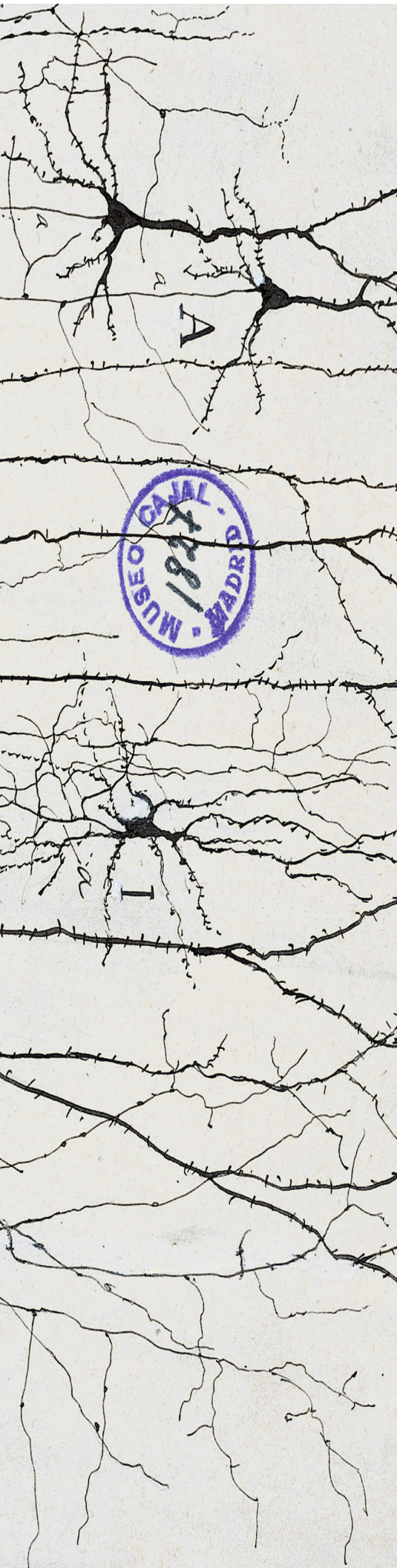
Buldú, M.J., Busquets, J., Echegoyen, I., Seirul.lo, F. (2019). Defining a historic football team: Using Network Science to analyse Guardiola's F.C. Barcelona. *Scientific Reports*. <https://doi.org/10.1038/s41598-019-49969-2>

Echegoyen, I., Vera-Ávila, V., Sevilla-Escoboza, R., Martínez, J.H., Buldú, M.J. (2019). Ordinal Synchronization: Using ordinal patterns to capture interdependencies between time series. *Chaos, Solitons & Fractals*. <https://doi.org/10.1016/j.chaos.2018.12.006>

2018

Sept-Dec

Doctoral stay in the Behavioural and Clinical Neuroscience Institute, at the Brain Mapping Unit from the Department of Psychiatry at the University of Cambridge (UK), under the supervision of Ed Bullmore and Petra Vertes. Analyses on complexity, entropy and functional connectivity on fMRI datasets.



Buldú, J., Busquets, X., Martínez, JM., Herrera-Diestra, JL., Echegoyen, I., Galeano, J., and Luque, J. (2018) Using network science to analyse football passing networks: dynamics, space, time and the multilayer nature of the game. *Opinion, Front. Psychol. - Movement Science and Sport Psychology*

Cinelli, M., Echegoyen, I., Oliveira, M., Orellana, S., Gili, T., (2018). Altered Modularity and Disproportional Integration in Functional Networks are Markers of Abnormal Brain Organization in Schizophrenia. Derived from the course *Complexity 72h*. arXiv:1805.04329 [q-bio.NC]

Echegoyen, Ignacio. [Ordinal Synchronization: A novel approach for quantifying synchronization](#). Santuy, A. (Ed) (2018). *2nd HBP Student Conference - Transdisciplinary Research Linking Neuroscience, Brain Medicine, and Computer Science*. Ljubljana, Frontiers Proceedings.

Echegoyen, Ignacio. [Brain Network's Synchronization Measures: a statistical approach](#). *Universidad Autónoma Ediciones*. M.Sc's thesis published in the University editorial

2014/15

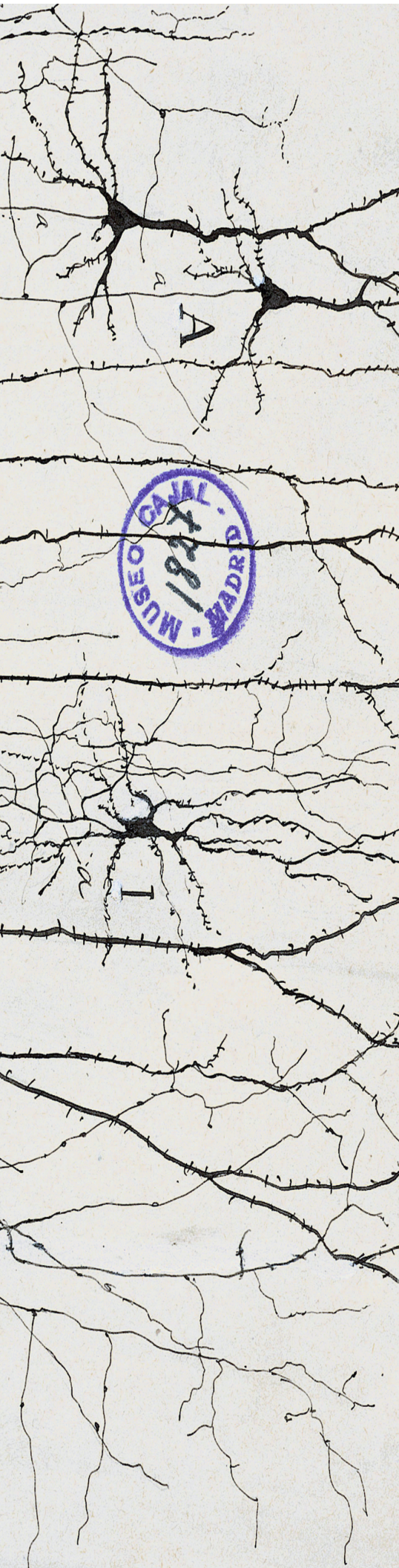
Prieto-Ursua, M. and Echegoyen, I. Self-forgiveness, self-acceptance or intrapersonal restoration? Open issues in the psychology of forgiveness. *Papeles del Psicólogo*, 2015. Vol. 36(3), pp. 230-237. Article derived from a year research scholarship at Comillas Pontifical University.

Intern Collaboration. Comillas Pontifical University and Civil Guard. Analysis of Event Related Potentials with Electroencephalogram (ERP-EEG): P300 as an indicator of latent information in oddball paradigm.

Intern Collaboration. Civil Guard, Airport Security, research on deception detection from non-verbal language and cognitive interview. From this collaboration, new analysis and custom intervention procedures were developed.

Given lectures, workshops and conferences

- Lectures *Frequency-based multilayer networks are impaired due to Alzheimer's disease* Sept. 2, 2019
- Invited speaker in the *Advanced methods for neuroimaging data analysis*. Université de Lille, France.
- From healthy aging to Alzheimer's disease: A multilayer network approach* Aug. 5-9, 2019
- Contributed speaker in the *Latin American Conference 2.0 on complex networks*. Universidad de los Andes, Cartagena, Colombia.
- Complex Brain Networks: Multilayer Architecture and Cognitive Decline* Sept, 2018
- Presentation of my PhD thesis at Ed Bullmore's groups in the Brain Mapping Unit. University of Cambridge, UK.
- What can brain science tell about your brain?* Oct. 4-6, 2017
- Invited speaker in the *V Colloquium on Research in Science and Technology*. Guadalajara University, Centre of los Lagos.



Conference: *15th Experimental Chaos and Complexity Conference* June 4-7, 2018

Organizing committee for the EEC15. Rey Juan Carlos University, Madrid, Spain

Course: *Network Brain Analysis: Practical applications* Oct. 4-6, 2017

20 hours sessions of practical tutorials (MATLAB) and theoretical analysis of functional brain networks; Guadalajara University, Centre of los Lagos.

Posters and ignite talks

2019

Network Science & Football: The hidden structure of Guardiola's Barcelona

Aug. 5-9, 2019

Buldú, M. J., Busquets, X., Echegoyen, I., Garrido, D., & Seirullo, F. Latin American Conference 2.0 on complex networks. Universidad de los Andes, Cartagena, Colombia

Altered Modularity and Disproportional Integration in Functional Networks are Markers of Abnormal Brain Organization in Schizophrenia Feb. 6-7, 2019

Cinelli, M., Echegoyen, I., Oliveira, M., Orellana, S., & Gili, T. 3rd HBP Student Conference: Interdisciplinary Brain Research [Poster and oral presentation]

2018

Mild cognitive impairment: Complexity and synchronization at sensor and source levels. Jul. 3-6, 2018

Project in collaboration with D. López-Sanz, F. Maestú. & J.M. Buldú. Presented at the First Joint Congress of the SEPEX, SEPNECA and AIP experimental.

Ordinal Synchronization:

a novel approach for quantifying synchronization

Feb. 15, 2018

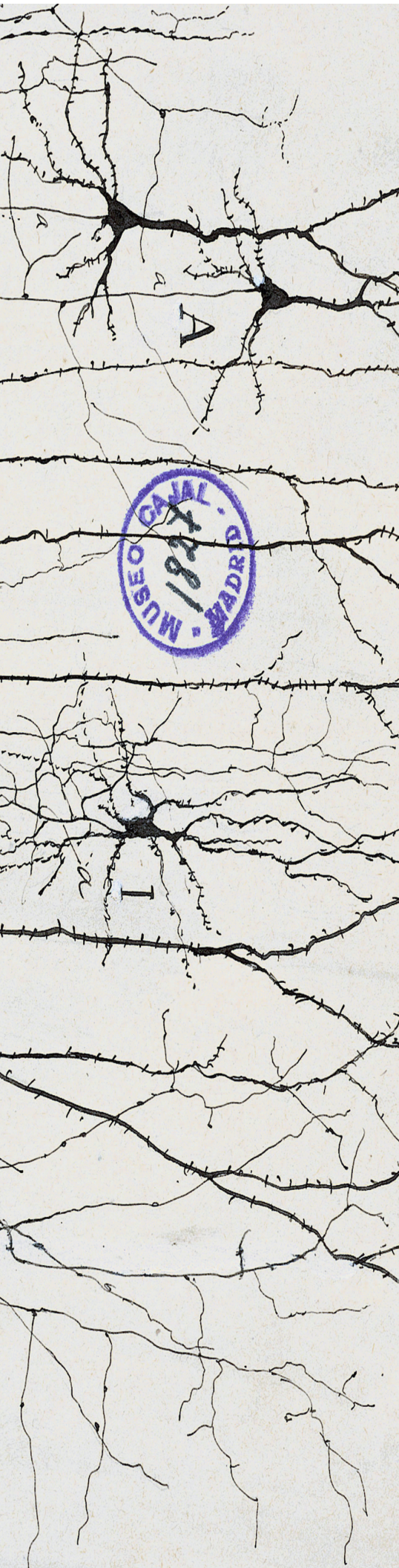
2nd HBP Student Conference: Transdisciplinary research linking neuroscience, brain medicine and computer science [Poster and oral presentation]. Continuation of the previous work presented in LANET and the 4th HBP School

Attended Conferences

Using Ordinal Synchronization to evaluate coordination between dynamical systems.

Analysis of a new synchronization measure based on ordinal patterns, implemented on coupled, Lorenz and Rössler oscillators. Project in collaboration with Sevilla, R., Vera, V., H. Martinez, J., M. Buldú, J. Presented at the:

- *Conference on Network Science (NetSci)*, Paris, France. (June 11-15, 2018).
- *15th Experimental Chaos and Complexity conference*, Madrid, Spain. Rey Juan Carlos University (June 4-7, 2018).
- *Latin American Conference on Complex Networks (LANET)*, Puebla, Mexico. Benemérita Universidad de Puebla (Sept. 25-29, 2017).
- *4th Human Brain Project (HBP) School Future Computing, Brain Science and Artificial Intelligence* (June 12-18, 2017)



2018

- International HBP conference* June 21-22
Understanding consciousness - a scientific quest for the 21st century. Barcelona, Spain
- School and Conference on Network Science (NetSci)* June 11-15
Brain Networks School, Cognitive Neuroscience and Network Neuroscience satellites and general conference on networks science's theory and applications. Paris, France
- Brain Hack Networks. International hackathon on complex brain networks* June 9-10
Multilayer brain network analyses on MEG datasets. Paris, France
- SINC2* May 23rd
One-day workshop on brain connectivity analysis from neural data. Barcelona, Spain.
- Complexity 72h* May 7-11
Workshop on complex science applications, group work on fMRI datasets and publication of results in Arxiv. Lucca, Italy
- 2nd HBP Student Conference: Transdisciplinary research linking neuroscience, brain medicine and computer science* Feb. 14-16
Conferences on whole brain dynamics simulation, neuromorphic computing and bioethics. Ljubljana, Slovenia
- XV Complex Systems Interdisciplinary Group (GISC) Workshop* Feb. 2
Conferences on complex systems (theory and applications). Madrid, Spain

2017

- IBERSINC Winter School* Nov. 22-24
Conferences on neuronal cultures, dynamical nonlinear models and theoretical neuroscience. Barcelona, Spain.
- LANET and School of Network Science* Sept. 24-29
Conferences on complex networks theory and applications, from mobility and spreading processes to genetics and neuronal cultures. Puebla, Mexico
- 4th HBP School: Future Computing, Brain Science and Artificial Intelligence* Jun. 12-18
Conferences on mind processes modelling, Machine Learning (theory and applications), statistical physics and visual perception. Workshop on career development and professional network management. Obergurgl, Austria
- IBERSINC and COMSOTEC meeting* Apr. 25-28
Theory and applications of multilayer networks, percolation, diffusion patterns and synchronization in dynamical systems. Madrid, Spain
- XIV GISC Workshop* Jan. 27
functional brain networks, molecular physics, social behaviour modelling and statistical physics. Madrid, Spain