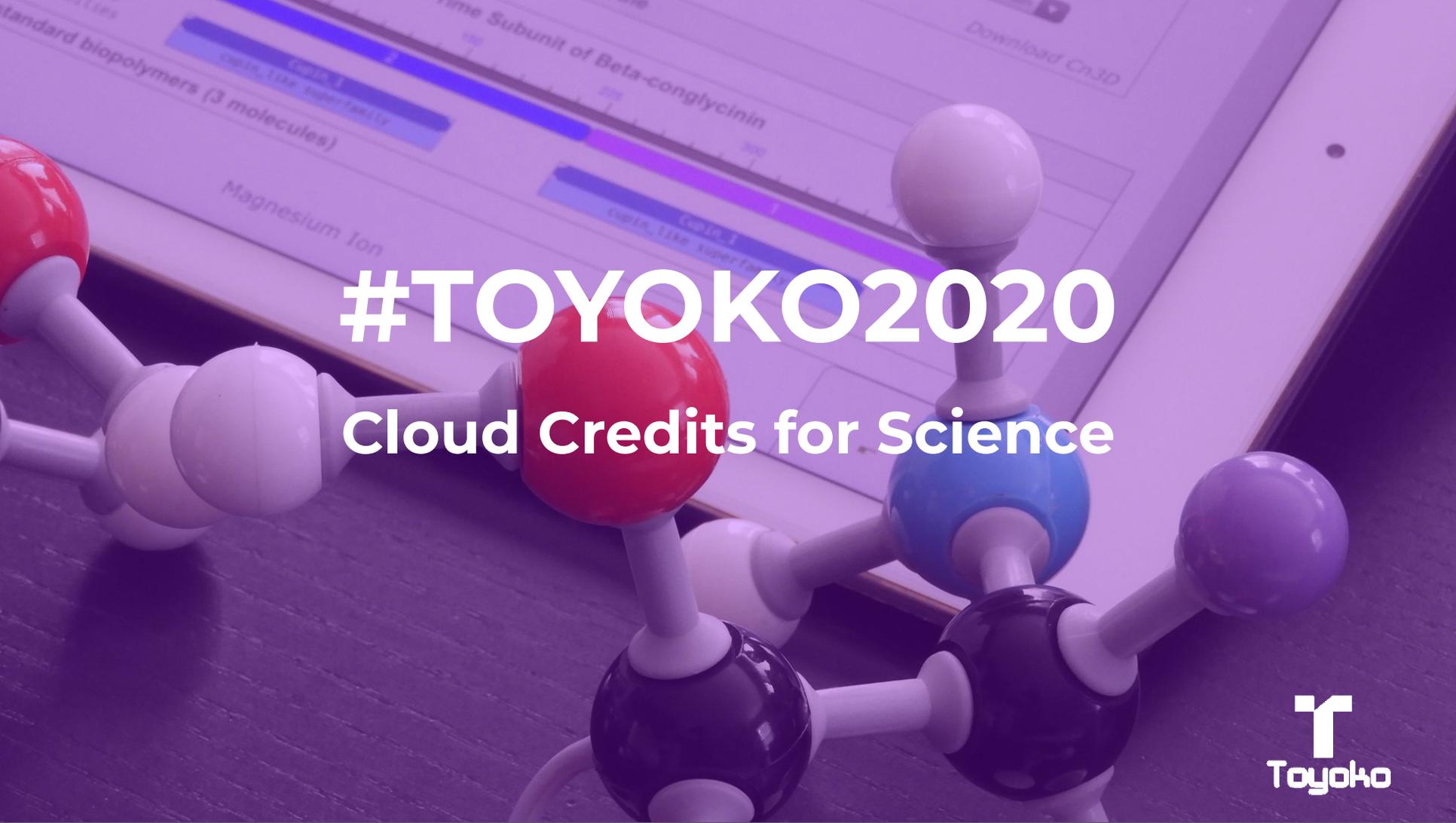




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Interactions



#TOYOKO2020

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* Fifteen thousand dollars for group.

The winners



COMPUTATIONAL COGNITIVE NEUROSCIENCE OF THE HUMAN CONSCIENCE

Enzo Tagliazucchi

Cognitive Neuroscience Laboratory - University of Buenos Aires



DEVELOPMENT OF THE NEW AI TECHNIQUES APPLIED TO THE QUANTIFICATION OF THE CARDIAC FUNCTION AND DIAGNOSIS OF MULTIPLE PATHOLOGIES

Germán Mato

Instituto Balseiro - CONICET



TOWARDS INTELLIGENT TELESCOPES

Mariano Dominguez

IATE-OAC-UNC - CONICET

Computational cognitive neuroscience of the human conscience

Dr. Enzo Tagliazucchi

Cognitive Neuroscience
Laboratory University of Buenos
Aires

<https://www.cocucolab.org/>

They will conduct high risk – high gain research projects involving the quantification of conscious states, and the landscape of their possible transformations in human subjects. This is achieved using a combination of behavioral, neuroimaging and bioinformatics data, together with computational modeling and the application of different machine learning algorithms. They will work on computational semantic and non-semantic analysis of free unconstrained language produced under different states of conscious awareness. They will perform NLP analyses of language to test if different markers linked to disorganized speech in psychosis can also manifest under the acute effects of LSD. In another work they will try to develop diagnosis and prognosis tools that can assist health care professionals in Alzheimer's disease and other neurodegenerative conditions.

Development of the new AI techniques applied to the quantification of the cardiac function and diagnosis of multiple pathologies

Dr. Germán Mato

Instituto Balseiro - CONICET

They will work on solving three different problems: 1- Analysis of cardiac nuclear magnetic resonance imaging (CMR) for the detection and automatic classification of the most relevant structures of the heart. 2- Detection of acute coronary disease in patients evaluated in the emergency department with precordial pain from electrocardiogram signals such as atrial fibrillation. 3- Quantify the longitudinal effort in an efficient way with a new methodology that will convert CMR axial images to an isotropic resolution by using Generative Adversarial Networks (GAN).

Towards intelligent telescopes

Dr. Mariano Dominguez

IATE-OAC-UNC and CONICET

They will focus on supervised learning and the applications of the state-of-art deep learning approaches on optical image transformations. The aim is to reconstruct and transform astronomical images from a certain imaging system into deep learning-enhanced new images that have e.g. improved resolution, less saturated sources, defects, masked pixels, and aberrations, statistically matching the images that would be expected from an astronomical pipeline imaging system. This specific research could lead us towards faster and simpler on the fly analysis of astronomical images using pre-trained networks that are the expected product of this proposal and could be easily put in inference chips that will conduct the reduction process in an intensive, near-real-time, high-volume computation.

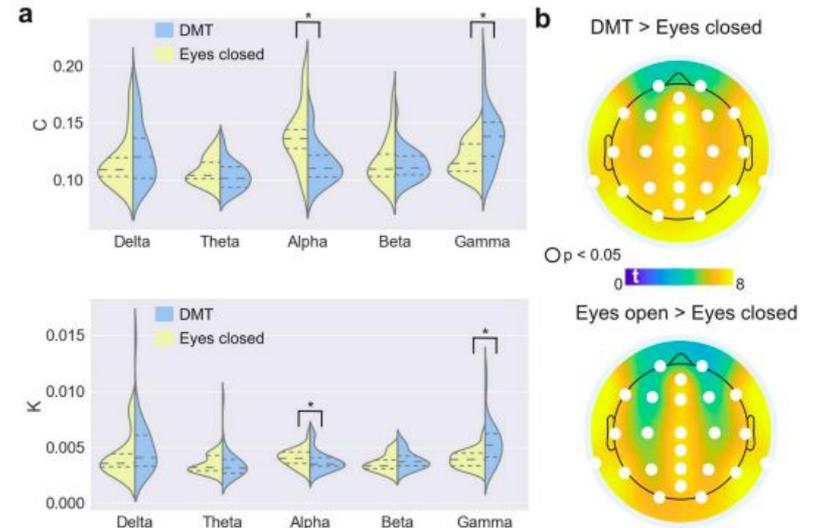
Toyoko contributed with cloud resources and support in the following publications, pre-prints and congress presentation:

Neural and subjective effects of inhaled N,N-dimethyltryptamine in natural settings.

<https://journals.sagepub.com/doi/abs/10.1177/0269881120981384?journalCode=jopa>

The first scientific publication in Argentina about the effects of a psychedelic in humans.

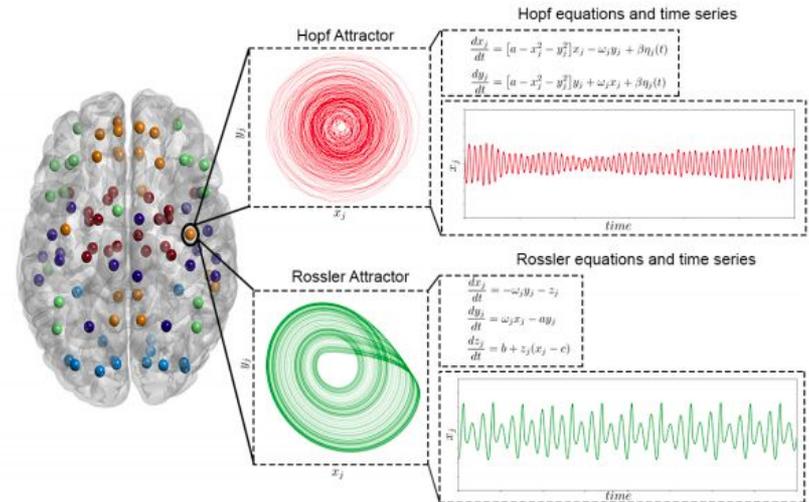
The psychedelics' study is revolutionizing the field of consciousness neuroscience and reformulating the therapeutic paradigms of contemporary psychiatry.



Noise-driven multistability vs deterministic chaos in phenomenological semi-empirical models of whole-brain activity.

<https://aip.scitation.org/doi/abs/10.1063/5.0025543?journalCode=cha>

The authors say -"We presented a simple model capable of jointly reproducing functional connectivity computed at different temporal scales. Besides adding to our conceptual understanding of brain complexity, our results inform and constrain the future development of biophysically realistic large-scale models."

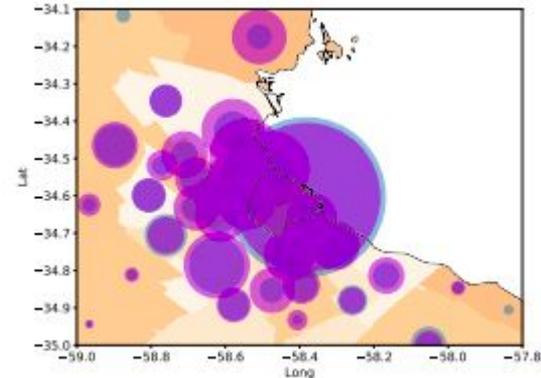


COVID-19

Lessons from being challenged by COVID-19

<https://www.sciencedirect.com/science/article/pii/S0960077920303180>

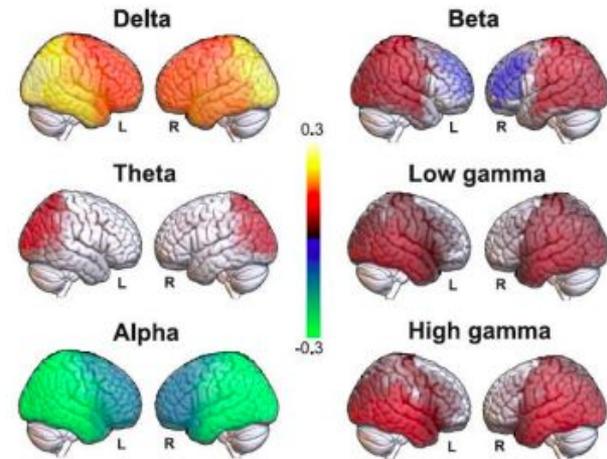
This work presents results of different approaches to model the evolution of the COVID-19 epidemic in Argentina. The researchers conclude, "These models should only be considered as ways of exploring possible solutions of the system, and extreme caution should be exercised whenever these models are used to generate advice in the process of public policy decision making".



Baseline power of theta oscillations predicts mystical-type experiences induced by DMT.

<https://www.biorxiv.org/content/biorxiv/early/2021/03/12/2021.03.11.434994.full.pdf>

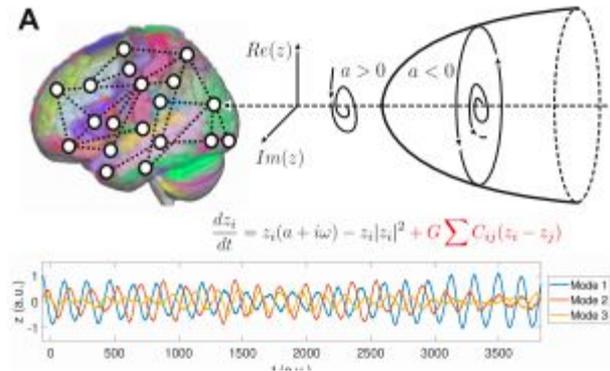
Some conclusions of the authors: "We also suggest that priming subjects to reduce their theta power before administration of a serotonergic psychedelic could enhance the likelihood of inducing mystical-type experiences, leading to sustained positive effects in well-being and improving the outcome of therapeutic interventions."



Non-equilibrium brain dynamics as a signature of consciousness.

<https://arxiv.org/pdf/2012.10792.pdf>

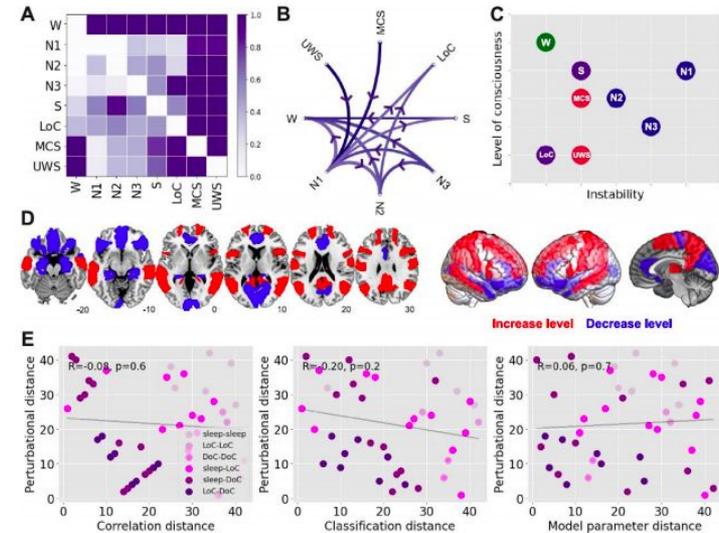
The authors demonstrated a link between a very general property of the brain as a macroscopic physical system, and the emergence of consciousness and cognition. They say: "Future studies should refine our conclusions, attempting to converge towards the relationship between dynamics and computation in neural tissue, one of the most challenging and long-standing problems in the field."



Perturbations in dynamical models of whole-brain activity dissociate between the level and stability of consciousness.

<https://www.biorxiv.org/content/10.1101/2020.07.02.185157v2.full.pdf>

This work "leads to a novel methodological framework to sort out different brain states by their stability and reversibility, and illustrates its usefulness to dissociate between physiological (sleep), pathological (brain injured patients), and pharmacologically-induced (anesthesia) loss of consciousness".



XXII Giambiagi School, Artificial intelligence and deep learning in physics. NOVEMBER 9TH – 13TH

Authors: Laura Alethia de la Fuente,
Mauro Namias, Enzo Tagliacruz

Neurophysiological aging patterns extracted by deep regression convolutional neural networks (CNNs) from t1-weighted MRI images: Brain maturation and aging on early-onset consumption of cocaine.





Thank you!

See you soon in

#Toyoko2021



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