

Daniel Yasumasa Takahashi  
Brain Institute  
Federal University of Rio Grande do Norte  
(November 2020)

## Personal Information

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**Website** <https://ethogenesis.science/>

## Positions held

**2019 –** Assistant Professor  
Brain Institute  
Federal University of Rio Grande do Norte, Natal, RN Brazil

**2015 – 2019** Associate Research Scholar  
Princeton Neuroscience Institute  
Princeton University, Princeton, NJ USA

**2010 – 2015** Postdoctoral Research Fellow  
Princeton Neuroscience Institute  
Princeton University, Princeton, NJ USA

**2009 - 2010** Postdoctoral Research Fellow  
Institute of Mathematics and Statistics  
Universidade de São Paulo, USP, Sao Paulo, Brazil

## Education

**2004 - 2009** PhD in Bioinformatics (Theoretical Neuroscience)  
Universidade de São Paulo, USP, Sao Paulo, Brazil  
Universidade de São Paulo  
Thesis: Measures of information flow in neuroscience (advisors: Koichi Sameshima and Luiz Antonio Baccalá)

**2004 - 2008** BSc in Applied Mathematics

Universidade de São Paulo, USP, Sao Paulo, Brazil  
Senior thesis: Schwartz kernel theorem (advisor: Paulo Domingos Cordaro)

**1998 - 2003** MD  
Universidade de São Paulo, USP, Sao Paulo, Brazil  
Graduation thesis: Applying artificial neural network in the diagnosis of Alzheimer's disease (advisor: Koichi Sameshima)

## Honors and Awards

**2018** Young Investigator Award from Brazilian Association of Bioinformatics and Computation Biology  
**2018** Cosyne travel award  
**2010-2012** Pew Latin American Fellowship  
**2009-2010** FAPESP Fellowship  
**2007** Travel Grant Award - 10th Tamagawa-Riken Dynamic Brain Forum  
**2006** Best Work Award - I Latin American School on Computational Neuroscience  
**2004-2008** CAPES Fellowship  
**2002** Oswaldo Cruz Award in medical research – Honorable mention  
**1998-2003** CNPq Fellowship  
**1997** Bronze medal – Brazilian Mathematical Olympiad

## In the media

My research findings were covered by several national and international news media: BBC News, BBC World Service Science in Action Radio, National Geographic News Watch, Daily Mail UK, Decoded Science, The Independent, Wired, io9, Science, Nature, National Public Radio, Deutschlandfunk, Science News, Journal da FAPESP, Estadão.

## Invited talks

2020 - Seminário de Psicobiologia da UFRN, *webninar*  
2020 - Seminar on Probability and Stochastic Process IME-USP, *webinar*  
2020 - Probability Webinar IM-UFRJ, *webinar*  
2020 - Mathematics and Neurobiology Intertwined, *webinar*  
2020 - Dias Probabilísticos no Fundão, UFRJ, Rio de Janeiro, *Brazil*  
2019 - ICe House Symposium, UFRN, Natal, *Brazil*

2019 - Brain Institute Seminar, UFRN, Natal, *Brazil*  
 2019 - Neurocolloquium, Tübingen, *Germany*  
 2019 - InDiQ, Université Paris-Saclay, Orsay, *France*  
 2019 - LLR seminar, École Polytechnique, Palaiseau, *France*  
 2019 - Pararel Decision Processing seminar, Princeton University, Princeton, *USA*  
 2019 - Presidential seminar on Society and Neuroscience, Columbia University, New York, *USA*  
 2019 - Princeton Neuroscience in-house Seminar, Princeton University, Princeton, *USA*  
 2018 - Society for Neuroscience Annual Meeting, San Diego, *USA*  
 2018 - X-meeting 2018, São Paulo, *Brazil*  
 2018 - Fifty Years of Thermodynamic Formalism, Leiden, *Netherland*  
 2018 - International Congress of Neuroethology, Brisbane, *Australia*  
 2018 – Université Paris-Sud, Orsay, *France*  
 2018 – IMEC, Leuven, *Belgium*  
 2018 – Psychology Department, Indiana University, Bloomington, *USA*  
 2018 – LASCON, University of São Paulo, *Brazil*  
 2017 – SciBr, Boston University, Boston, *USA*  
 2016 – Marmoset Conference, Tokyo, *Japan*  
 2016 – Department of Life Sciences, University of Tokyo, Tokyo, *Japan*  
 2016 – Physics Department, Universidad Autónoma de San Luis Potosí, San Luis Potosí, *Mexico*  
 2016 – Riken Brain Science Institute, Saitama, *Japan*  
 2016 – International Congress of Psychology, Yokohama, *Japan*  
 2016 - Workshop on Evo-Devo of Vocal Learning and Plasticity, Tokyo, *Japan*  
 2016 - Second Neuromat Workshop, São Paulo, *Brazil*  
 2016 - Friedrich Miescher Institute for Biomedical Research, Basel, *Switzerland*  
 2016 – Neuroscience and Social Decision Seminar, Princeton University, *USA*  
 2015 – Institute of Mathematical Sciences and Computation, USP São Carlos, São Paulo, *Brazil*  
 2015 – Workshop on Stochastic chains, Hitting Times, Return Times, Long Range Dependence, UFSCAR, São Paulo, *Brazil*  
 2014 - First Neuromat Workshop, São Paulo, *Brazil*  
 2014 - Neuroscience and Social Decision Seminar, Princeton University, *USA*  
 2013 – Workshop on Statistical Methods for Neuronal Data, Paris, *France*  
 2013 – Department of Mathematics, Laboratoire J.A. Dieudonné, Université de Nice, Nice, *France*  
 2012 - Annual Meeting of the Pew Biomedical Sciences Programs, Panama, *Panama*  
 2012 – BRhyCoCo, New York University, *USA*  
 2012 – IBRG meeting, Princeton University, *USA*  
 2011 – Workshop on Chains and Systems with Interactions of Variable Range, São Paulo, *Brazil*  
 2011 – NUMEC Workshop, São Paulo, *Brazil*  
 2010 – Department of Mathematics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, *Brazil*

2010 – Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, *Brazil*  
2009 - Jorma's Razor I, São Paulo, *Brazil*  
2009 – NUMEC Workshop, São Paulo, *Brazil*  
2009 – Department of Mathematics, Università degli Roma Tre, Rome, *Italy*  
2008 – International Brain Research Organization (IBRO)/LARC Conference, Rio de Janeiro, *Brazil*  
2006 – CONICYT-INSERM Workshop “Networks in Cognitive Systems”, Complex System Institute, Valparaiso, *Chile*

## **Reviewer**

Ad hoc reviewer for National Science Foundation (NSF)  
Ad hoc reviewer for Leakey Foundation Research Grant  
Ad hoc reviewer for scientific journals: Science, Nature Communication, Current Biology, Plos Biology, Plos Computational Biology, Animal Behaviour, Open Biology, Biology Letters, IEEE Transactions on Biomedical Engineering, Entropy, Frontiers in Psychology, Scientific Report, Biology Direct, Plos One, Frontiers in Neuroscience, Games, Entropy, Journal of Experimental Biology, Royal Society Open Science, American Journal of Primatology, BMC Biology

## **Articles Published in Peer-Reviewed Journals**

Google scholar = <https://scholar.google.com/citations?user=DyIxrZUAAA&hl=en>

\* = equal contribution

# = co-corresponding author

### ***Vocal communication***

Ghazanfar AA, Kelly LM, **Takahashi DY**, Winters S, Terret R, Higham JP  
Domestication phenotype linked to vocal behavior in marmoset monkeys  
*Current Biology*, doi: 10.1016/j.cub.2020.09.049

Zhang YS, **Takahashi DY**, Liao DA, Ghazanfar AA<sup>#</sup> and Elemans CPH<sup>#</sup> (2019)  
Vocal state change through laryngeal development.  
*Nature Communications*, 10:4592 doi: 10.1038/s41467-019-12588-6

Gustison ML, Borjon JI, **Takahashi DY**<sup>#</sup>, Ghazanfar AA<sup>#</sup> (2019)

Vocal and locomotor coordination develops in association with arousal state.  
*eLife*, e41853, doi: 10.7554/eLife.41853

Ghazanfar AA, Liao DA, **Takahashi DY** (2019)  
Volition and learning in primate vocal behaviour  
*Animal Behaviour*, doi: 10.1016/j.anbehav.2019.01.021

Sliwa J, **Takahashi DY**, Shepherd SV (2018)  
Mécanismes neuronaux pour la communication chez les primates.  
*Revue de Primatologie*, 9, doi: 10.4000/primatologie.2950

**Takahashi DY**<sup>#</sup>, Liao DA, Ghazanfar AA<sup>#</sup> (2017)  
Vocal learning via social reinforcement by infant marmoset monkeys  
*Current Biology*, v. 27, 1844-1852, doi: 10.1016/j.cub.2017.05.004

Teramoto Y\*, **Takahashi DY**<sup>\*\*</sup>, Holmes P<sup>#</sup>, Ghazanfar AA<sup>#</sup> (2017)  
Vocal development in a Waddington landscape.  
*eLife*, 6:e20782. doi: 10.7554/eLife.20782

Borjon JI, **Takahashi DY**<sup>#</sup>, Cervantes DC, Ghazanfar AA<sup>#</sup> (2016)  
Arousal dynamics drive vocal production in marmoset monkeys.  
*Journal of Neurophysiology*, v. 116, 753-764.

**Takahashi DY**<sup>\*</sup>, Fenley AR<sup>\*</sup>, Ghazanfar AA (2016)  
Early development of turn-taking with parents shapes vocal acoustics in infant marmoset monkeys.  
*Philosophical Transaction of Royal Society B*, v. 371, doi: 10.1098/rstb.2015.0370

**Takahashi DY**<sup>#</sup>, Fenley AR, Teramoto, Y, Narayanan DZ, Borjon JI, Holmes P, Ghazanfar AA<sup>#</sup> (2015)  
The developmental dynamics of marmoset monkey vocal production.  
*Science*, v. 349, 730-734.

Choi JY, **Takahashi DY**<sup>#</sup>, Ghazanfar AA<sup>#</sup> (2015)  
Cooperative vocal control in marmoset monkeys via vocal feedback.  
*Journal of Neurophysiology*, v. 114, 274-283.

Ghazanfar AA, **Takahashi DY** (2014)  
The evolution of speech: vision, rhythm, cooperation.  
*Trends in Cognitive Sciences*, v. 18, 543-553.

Ghazanfar AA, **Takahashi DY** (2014)  
Facial expressions and the evolution of the speech rhythm.  
*Journal of Cognitive Neuroscience*, v. 26, 1196-1207

**Takahashi DY<sup>#</sup>**, Narayanan DZ, Ghazanfar AA<sup>#</sup> (2013)  
Coupled oscillator dynamics of vocal turn-taking in monkeys.  
*Current Biology*, v. 23, 2162-2168.

Ghazanfar AA, **Takahashi DY**, Mathur NA, Fitch WT (2012)  
Cineradiography of monkey lipsmacking reveals the putative origins of speech dynamics.  
*Current Biology*, v. 22, p. 1176-1186.

### ***Statistical methods for connectivity analysis - theory***

Baccalá LA, **Takahashi DY**, Sameshima, K (2016)  
Directed Transfer function: Unified asymptotic theory and some of its implications.  
*IEEE Transactions of Biomedical Engineering*, v. 63, 2450-2460.

**Takahashi DY\*** and Lerasle M\* (2016)  
Sharp oracle inequalities and slope heuristic for specification probabilities estimation in discrete random fields.  
*Bernoulli*, v. 22, 325-344.

Sameshima K, **Takahashi DY**, Baccalá LA (2015)  
On statistical performance of Granger-causal connectivity estimators  
*Brain informatics*, doi: 10.1007/s40708-015-0015-1

**Takahashi DY\***, Galves A\*, Orlandi E\* (2015)  
Identifying interacting pairs of sites in Ising models on a countable set.  
*Brazilian Journal of Probability and Statistics*, v. 29, 443-459.

**Takahashi DY**, Baccalá LA, Sameshima K (2014)  
Canonical information flow decomposition among neural structure subsets.  
*Frontiers in Neuroinformatics*, doi: 10.3389/fninf.2014.00049 c

Baccalá LA, de Brito CS, **Takahashi DY**, Sameshima K (2013)  
Unified asymptotic theory for all partial directed coherence forms  
*Philosophical Transactions of the Royal Society A*, v. 371, 20120158

**Takahashi DY\***, Lerasle M\* (2011)  
An oracle approach for interaction neighborhood estimation in random fields.  
*Electronic Journal of Statistics*, v. 5, p. 534-571.

**Takahashi DY**, Baccalá LA, Sameshima K (2010)  
Information theoretic interpretation of frequency domain connectivity measures.  
*Biological Cybernetics*, v.103, p. 463-469.

**Takahashi DY**, Baccalá L, Sameshima K (2008)  
Partial directed coherence asymptotics for VAR processes of infinite order.  
*International Journal of Bioelectromagnetism*, v. 10, p. 31-36.

**Takahashi DY**, Baccalá LA, Sameshima K (2007)  
Connectivity Inference via Partial Directed Coherence.  
*Journal of Applied Statistics*, v. 34, p. 1259-1273.

### ***Statistical methods for connectivity analysis - application***

Fujita A, Silva EL, Santos SDS, Bando SY, Soares GE, Takahashi DY (2019)  
A semi-parametric statistical test to compare complex networks.  
*Journal of Complex Networks*, cnz028, doi:[10.1093/comnet/cnz028](https://doi.org/10.1093/comnet/cnz028)

Fujita A, **Takahashi DY**, Balardin JB, Vidal MC, Sato JR (2017)  
Correlation between graphs with an application to brain network analysis  
*Computational Statistics & Data Analysis*, v. 109, 76-92

Fujita A, Vidal MC, **Takahashi DY** (2017)  
A statistical method to distinguish functional brain networks  
*Frontiers in Neuroscience*, v. 11, doi:[10.3389/fnins.2017.00066](https://doi.org/10.3389/fnins.2017.00066)

Vidal MC, Sato JR, Balardin JB, **Takahashi DY**, Fujita A (2017)  
ANOCVA in R: A Software to Compare Clusters between Groups and Its Application to  
the Study of Autism Spectrum Disorder  
*Frontiers in Neuroscience*, v. 11, doi:[10.3389/fnins.2017.00016](https://doi.org/10.3389/fnins.2017.00016)

Fujita A, **Takahashi DY**, Patriota AG, Sato JR (2014)  
A non-parametric statistical test to compare clusters with applications in functional  
magnetic resonance imaging data.  
*Statistics in Medicine*, v. 33, 4949-4962.

Fujita A, **Takahashi DY**, Patriota A (2014)  
A non-parametric method to estimate the number of clusters.  
*Computational Statistics and Data Analysis*, v. 73, 27-39.

Santos SS, **Takahashi DY**, Nakata A, Fujita A (2013)  
A comparative study of statistical methods used to identify dependencies between gene  
expression signals  
*Briefing in Bioinformatics*, v. 15, 906-918.

Sato JR., **Takahashi DY**, Hoexeter, MQ, Massirer KM, Fujita A (2013)  
Measuring network's entropy in ADHD: A new approach to investigate neuropsychiatric

disorders

*Neuroimage*, v. 77, 44-51.

**Takahashi DY**, Sato JR, Ferreira CE, Fujita A (2012)

Discriminating different classes of biological networks by analyzing the graphs spectra distribution.

*PLoS ONE*, v. 7(12): e49949. doi:10.1371/journal.pone.0049949

Sato JR, **Takahashi DY**, Arcuri SM, Sameshima K, Morettin PA, Baccalá, LA (2009)

Frequency domain connectivity identification: An application of partial directed coherence in fMRI.

*Human Brain Mapping*, v. 30, 452-461.

Dzirasa K., Ramsey AJ, **Takahashi DY**, Stapleton J, Potes JM, Williams JK, Gainetdinov RR, Sameshima K, Caron MG, Nicolelis MAL (2009)

Hyperdopaminergia and NMDA Receptor Hypofunction Disrupt Neural Phase Signaling.

*The Journal of Neuroscience*, v. 29, 8215-8224.

Sato JR, Felix MM, **Takahashi DY**, Amaro Jr E, Brammer MJ, Morettin PA (2006)

A method to produce evolving functional connectivity maps during the course of an fMRI experiment using wavelet based time-varying Granger causality.

*NeuroImage*, v. 31, 187-196.

Sato JR, **Takahashi DY**, Cardoso EF, Martin MGM, Amaro Jr E, Morettin PA (2006)

Intervention Models in Functional Connectivity Identification Applied to fMRI.

*International Journal of Biomedical Imaging*, doi: 10.1155/IJBI/2006/27483

### ***Stochastic process - theory***

**Takahashi DY\***, Gallesco C\*, Gallo S\* (2018)

Dynamic uniqueness for stochastic chains with unbounded memory.

*Stochastic Processes and their Applications*, doi: 10.1016/j.spa.2017.06.004

**Takahashi DY\***, Gallo S\* (2014)

Attractive regular stochastic chains: perfect simulation and phase transition.

*Ergodic Theory and Dynamical System*, v. 34, 1567-1586

**Takahashi DY\***, Gallesco C\*, Gallo S\* (2014)

Explicit estimates in the Bramson-Kalikow model

*Nonlinearity*, v. 27, 2281-2296.

**Takahashi DY\***, Gallo S\*, Lerasle M\* (2013)

Markov approximations of chains of infinite order in the  $\bar{d}$ -metric



***Alzheimer disease***

Raicher I, Shimizu M, **Takahashi DY**, Nitrini R, Caramelli P (2008)  
Alzheimer's disease diagnosis disclosure in Brazil: a survey of specialized physicians' current practice and attitudes.  
*International Psychogeriatrics*, v. 20, 471-481.

Shimizu M, Raicher I, **Takahashi DY**, Caramelli P, Nitrini R (2008)  
Disclosure of the diagnosis of Alzheimer's disease: caregivers' opinions in a Brazilian sample.  
*Arquivos de Neuro-Psiquiatria*, v. 66, 625-630.

Raicher I, **Takahashi DY**, Kanda PAM, Nitrini R, Anghinah R (2008)  
qEEG spectral peak in Alzheimer's disease: a possible tool for treatment follow-up.  
*Dementia & neuropsychologia*, v. 2, 9-12.

Vittiello AP, Ciriaco JG, **Takahashi DY**, Nitrini R, Caramelli P (2007)  
Brief cognitive evaluation of patients attended in a general neurological outpatient clinic.  
*Arquivos de Neuro-Psiquiatria*, v. 65, 299-303.

Nitrini R, Caramelli P, Herrera E, Castro I, Bahia VS, Anghinah R, Caixeta L, Radanovic M, Charchat-Fichman H, Porto CS, Carthery MT, Hartmann APBJ, Huang N, Smid J, Lima P, **Takahashi DY**, Takada LT (2005)  
Mortality from dementia in a community-dwelling Brazilian population.  
*International Journal of Geriatric Psychiatry*, v. 20, 247-253.

Nitrini R, Caramelli P, Herrera E, Bahia VS, Caixeta L, Radanovic M, Anghinah R, Charchat-Fichman H, Porto CS, Carthery MT, Hartmann APBJ, Huang N, Smid J, Lima P, Takada LT, **Takahashi DY** (2005)  
Incidence of dementia in a community-dwelling Brazilian population.  
*Alzheimer Disease and Associated Disorders*, v. 18, 241-246.

Anghinah R, Caramelli P, **Takahashi DY**, Nitrini R, Sameshima K (2005)  
EEG alpha band coherence analysis in healthy adults: preliminary results.  
*Arquivos de Neuro-Psiquiatria*, v. 63, 83-86.

Hartmann APBJ, Almeida SM, Livramento JA, Nitrini R, **Takahashi DY**, Caramelli P (2004)  
Hyperphosphorylated tau protein in the cerebrospinal fluid of patients with Alzheimer's disease and other dementias: preliminary findings.  
*Arquivos de Neuro-Psiquiatria*, v. 62, 751-755.

### ***Diagnosis in medicine***

Lopes RI, Nogueira L, Albertotti CJ, **Takahashi DY**, Lopes RN (2008)  
Comparison of of virtual cystoscopy and transabdominal ultrasonography with conventional cystoscopy for bladder tumor detection.  
*Journal of Endourology*, v. 22, 1725-1729.

Sameshima K, **Takahashi DY**, Baccalá, LA (2005)  
Avaliando a complexidade da dinâmica cardiovascular por entropia amostral.  
*Revista Brasileira de Hipertensão*, v. 12, 27-32.

Costa GGO, Ctenas BB, **Takahashi DY**, Mion O, Mello JJF, Butugan O (2005)  
Comparação entre a Rinometria Acústica, 'Peak Flow' Nasal Inspiratório e sua Correlação com Sintomas e Sinais Clínicos de Rinite.  
*Arquivos de Otorrinolaringorologia*, v. 9, 203-211.

### **Book Chapters**

Sliwa J, **Takahashi DY**, Shepherd SV (2017)  
Neural mechanisms of communication  
*In: The Wiley Handbook of Evolutionary Neuroscience*, ed: Shepherd, Wiley-Blackwell, 444-477

Ghazanfar AA, **Takahashi DY** (2016)  
The evo-devo of vocal communication: insights from marmoset monkeys  
*In: Evolution of nervous systems*, ed: Kaas, Academic Press, 317-324

Santos SS, **Takahashi DY**, Sato JR, Ferreira CE, Fujita A (2016)  
Statistical Methods in Graphs: Parameter Estimation, Model Selection, and Hypothesis Test  
*Mathematical Foundations and Applications of Graph Entropy*, v. 98, 183-202

**Takahashi DY**, Baccalá LA, Sameshima K (2014)  
Information partial directed coherence  
*In: Methods in Brain Connectivity Inference through Multivariate Time Series Analysis*, ed: Baccalá, Sameshima. CRC Press, 75-86.

Baccalá LA, **Takahashi DY**, Sameshima K (2014)  
Asymptotic PDC properties

*In: Methods in Brain Connectivity Inference through Multivariate Time Series Analysis*, ed: Baccalá, Sameshima, CRC Press, 113-131.

Baccalá LA, **Takahashi DY**, Sameshima K (2006)

Computer intensive testing for the influence between time-series

*In: Handbook of Time Series Analysis* ed: Wilterhalter; Schelter; Timmer, Springer, 411-435.

Sameshima K, **Takahashi DY** (2004)

Métodos Quantitativos em Medicina

*In: Métodos Quantitativos em Medicina* ed: Massad, Ortega, Silveira. Manole, v.1, 493-526.

**Takahashi DY**, Charchat H, Nitrini R, Caramelli P, Sameshima K (2000)

Exploração de redes neurais artificiais no auxílio ao diagnóstico neuropsicológico da doença de Alzheimer.

*In: Anais do I congresso de lógica aplicada à tecnologia – LAPTEC 1*, Plêiade, v.1, 359-371.

## **Articles Published in Peer-Reviewed Proceedings**

**Takahashi DY**, Narayanan DZ, Ghazanfar AA (2013)

Development of self-monitoring essential for vocal interaction in marmoset monkeys

*ICDL-EPIROB Conference*, doi: 10.1109/DevLrn.2013.6652553

**Takahashi DY**, Narayanan DZ, Ghazanfar AA (2013)

A computational model for vocal exchange dynamics and their development in marmoset monkeys

*ICDL-EPIROB Conference*, doi: 10.1109/DevLrn.2012.6400844

Brito SC, Baccalá LA, **Takahashi DY**, Sameshima K (2010)

Asymptotic behavior of generalized partial directed coherence

*IEEE Engineering in Medicine and Biology Society. Conf.* , v.1, p.1718 - 1721.

**Takahashi DY**, Baccalá LA, Sameshima K (2010)

Frequency domain connectivity: an information theoretic perspective

*IEEE Engineering in Medicine and Biology Society. Conf.* , v.1, p.1726 - 1729.

Baccalá LA, **Takahashi DY**, Sameshima K (2007)

Generalized Partial Directed Coherence

*International Conference on Digital Signal Processing*, v.1. p.162 - 166

**Takahashi DY**, Charchat H, Caramelli P, Nitrini R, Sameshima K (2000)  
Análise da não-linearidade do modelo diagnóstico neuropsicológico da doença de Alzheimer por redes neurais artificiais  
*Anais do VII congresso brasileiro de informática em saúde*

## **Comments**

Takahashi DY, Ghazanfar AA (2014)  
Vocal communication is multi-sensorimotor coordination within and between individuals  
*Behavioral and Brain Sciences*, v. 37, 572-573.

## **Research Supports**

### *Current supports*

2013-2023 – FAPESP 2013/ 07699-0 (collaborator)  
Center for Neuromathematics.

### *Completed supports*

2016-2018 - FAPESP 2016/13422-9 (collaborator)  
Statistical methods on graphs applied in life science.

2014-2016 – CNPq 462064/2014-0 (collaborator)  
Finitary coding and chains of long memory

2012-2014 – USP project (collaborator)  
Mathematics, computation, language, and the brain

2012-2014 – CNPq 480108/2012-9 (collaborator)  
Stochastic modeling of the brain activity

2008-2009 – FAPESP 2008/08171-0 (PI)  
Modeling neuronal population by interactive particle system of variable length interaction