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Laboratoire des systèmes perceptifs (UMR 8248)
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Research Experience

Sept. 2020	**Postdoctorate Research Fellow** *Under the supervision of Pascal Mamassian and Ruben Coen-Cagli.* Laboratoire des Systèmes Perceptifs (LSP), École Normale Supérieure (ENS), Paris
2017–2020	**Postdoctorate Research Fellow** *Under the supervision of Ruben Coen-Cagli and Pascal Mamassian.* Department of Comp. Biology, Albert Einstein College of Medicine (AECOM), New-York.
Jan. – Sept. 2017	**Postdoctorate Research Fellow** *Under the supervision of Gabriel Peyré.* Département de Mathématiques et Applications (DMA), École Normale Supérieure (ENS), Paris.
2013–2017	**PhD under the supervision of G. Peyré and C. Monier** *Applied Mathematics and Neurosciences. Dynamic Textures Synthesis for Probing Vision in Psychophysics and Electrophysiology.* Dauphine University (Paris Sciences Lettres), Paris. Unité Neuroscience, Information et Complexité (UNIC-CNRS), Gif-sur-Yvette.
2011–2012	**Research internship under the supervision of J-M. Morel and B. Coll** *Texture synthesis: the Portilla-Simoncelli algorithm (statistical tools, optimization, C implementation).* Universitat de les Illes Balears, Mallorca. Centre de Mathématiques et de Leurs Applications (CMLA), Cachan.

Research Supervision

Jun. – Jul. 2020	**Elliot Kim** *Project: Comparing mixture models trained on neural activity vs natural image stimuli.* Department of Comp. Biology, Albert Einstein College of Medicine (AECOM), New-York *Co-supervisor: Ruben Coen-Cagli*
Mar. – Apr. 2020	**Alexander Ferrena** *Project: Studying the possibility to use Generative Adversarial Networks to generate image from neural activity and vice-versa.* Department of Comp. Biology, Albert Einstein College of Medicine (AECOM), New-York *Co-supervisor: Ruben Coen-Cagli*

List of Contributions

Pre-prints

Vacher J., Briand T., The Portilla-Simoncelli Texture Model: Towards the Understanding of the Early Visual Cortex, *Under review: Image Processing On Line* Link

Vacher J., Coen-Cagli R., Combining mixture models with linear mixing updates: multilayer image segmentation and synthesis, *arXiv 1905.10629, 2019* Link

Vacher J., Mamassian P., Coen-Cagli R., Probabilistic Model of Visual Segmentation, *arXiv 1806.00111, 2019* Link

Journals

Le Coënt A., Fribourg L., Vacher J., Wisniewski, R., Probabilistic reachability and control synthesis for stochastic switched systems using the tamed Euler method, *Nonlinear Analysis: Hybrid Systems, 2020* Link

Roggerone V., Vacher J., Tarlao C., Guastavino C., Auditory motion perception emerges from successive sound localizations integrated over time, *Scientific Reports, 2019* Link

Vacher J., Meso A. I., Perrinet L. U., Peyré G., Bayesian Modeling of Motion Perception using Dynamical Stochastic Textures, *Neural Computation, 2018* Link

Briand T., Vacher J., How to Apply a Filter Defined in the Frequency Domain by a Continuous Function ?, *Image Processing On Line 6, 183-211, 2016* Link

Briand T., Vacher J., Galerne B., Rabin J., The Heeger-Bergen Pyramid Based Texture Synthesis Algorithm, *Image Processing On Line 4, 276–299, 2014* Link

Conferences

Vacher J., Davila A., Kohn A., Coen-Cagli R., Texture Interpolation for Probing Visual Perception, *Advances in Neural Information Processing Systems, -, 2020* Link

Le Coënt A., Fribourg L., Vacher J, Control synthesis for stochastic switched systems using the tamed euler method, *IFAC Conference on Analysis and Design of Hybrid Systems, 2018* Link

Vacher J., Meso A. I., Perrinet L. U., Peyré G., Biologically Inspired Dynamic Textures For Probing Motion Perception, *Advances in Neural Information Processing Systems, 1918-1926, 2015* Link

Participation in Conferences

Upcoming

Dec. 2020	Poster and spotlight presentation: Texture Interpolation for Probing Visual Perception *Neural Information Processing Systems (NeurIPS)* Link

Past

June. 2020	Poster: Measuring and Modeling Human Probabilistic Segmentation Maps *Vision Science Society (VSS) 2020* Link
Feb. 2020	Poster: Measuring Human Probabilistic Segmentation Maps *Computational and Systems Neuroscience (Cosyne) 2020* Link
Aug. 2019	Talk: An ideal observer model for grouping and contour integration in natural images *European Conference on Visual Perception* Link
June 2016	Poster: Supervised Learning Estimation of Functional Maps from VSD Imaging *International Conference on Mathematical NeuroScience (ICMNS)* Link
Dec. 2015	Poster and spotlight presentation: Biologically Inspired Dynamic Textures for Probing Motion Perception *Neural Information Processing Systems (NeurIPS)* Link
June 2015	Talk: Dynamic Texture Synthesis for Probing Visual Perception *7e Biennale Française des Mathématiques Appliquées et Industrielles (SMAI 2015)* Link

June 2015	Poster: A Mathematical Account of Dynamic Texture Synthesis for Probing Visual Perception *International Conference on Mathematical NeuroScience (ICMNS)* Link
Oct. 2014	Poster: Dynamic Textures for Probing Visual Perception *Workshop on Geometrical Models in Vision* Link

Participation in Review Committees

Conferences

Neural Information Processing Systems 2019–2020 (NeurIPS): Website
International Conference on Machine Learning 2020 (ICML): Website
International Conference on Learning Representations 2020 (ICLR): Website
Limited Labeled Data workshop @ICLR 2018–2019: Website
Computational and Systems Neuroscience 2020 (Cosyne): Website

Journals

Image Processing On Line Journal (IPOL): Website
IEEE Transactions on Visualization and Computer Graphics: Website
Vision Research: Website

Professional Society Membership

since 2015	**Société de Mathématiques Appliquées et Industrielles** Link
since 2019	**Vision Science Society** Link

Awards and Scholarships

March 2019	**Seal of Excellence for the project "Decompose the hierarchical process of human visual segmentation"** *Certificate delivered by the European Commission, as the institution managing Horizon 2020, the EU Framework Programme for Research and Innovation 2014-2020* Link
2012–2013	**Excelence Master's Scholarship** *Funding (10 000 euros) from the Fondation de Mathématiques Jacques Hadamard (FMJH)* Link

Computer Science

Operating systems	Linux, Windows
Languages	Python (parallel/GPU computing, scikit-learn, deep learning with PyTorch), Matlab (including PsychToolbox for psychophysics), basic knowledge in C/C++, basic knowledge in JavaScript (jspsych for online psychophysics)
Data knowledge	natural images, psychometric results, extracellular recordings, brain optical imaging

Teaching Activities

Oct. 2016	**French tenured civil servant as teacher in mathematics** *Availability for postdoctoral research.*
2013–2015	**Lecturer in Analysis, Linear Algebra, Differential Calculus** *Three hours a week. Mid to high level students.* Dauphine University, Paris.
July 2013	**Highest mathematics competitive exam for academic teaching** *Agrégation de mathématiques. French trainee civil servant as teacher in mathematics.*

2011–2013 **Examiner in mathematics** *Oral exam training. Two hours a week. High level students.* Classes Préparatoires aux Grandes Écoles, Janson de Sailly high school, Paris.

Higher Education

2013–2017 **PhD in Applied Mathematics** Dauphine University (Paris Sciences Lettres), Paris.

2011–2013 **Master's degree in mathematics** *Mathematics, Vision and Learning. Graduated with honours.* École Normale Supérieure de Cachan.

2010–2011 **Bachelor's degree in mathematics** *Applied Mathematics. Graduated with honours.* École Normale Supérieure de Cachan.

Languages

French: native / English: fluent / Spanish: basic understanding

Interests and other activities

Sports: rock climbing/bouldering, biking, hiking, tennis, table tennis, handball...
Video/Board Games: hearthstone, megawatt, smallworld, 7 wonders, terra mystica, king domino, ...
Music, cinema, sciences, social sciences, economy, politics, ...
President of the association "Les sENS de l'Art" in 2012: in charge of the organization of the annual art and music festival of ENS Cachan (budget: 40 000 euros).