GREGORY OPERTO, Ph. D.

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ResearchGate : http://researchgate.net/profile/Gregory_Operto

Grégory Operto has been now studying the human brain for more than 10 years using advanced techniques and developing new methods in brain image processing. After graduating in 2005 from Polytech-Marseille with a major in Biomedical Engineering, he received his PhD in Computer Science from Aix-Marseille University in 2009. He then joined **NeuroSpin**, the high-field MRI center of the **Commissariat à l'Energie Atomique** (Atomic Energy Commission). His research interests focus on early detection in Alzheimer's Disease and the aging brain. Between 2011 and 2016, he managed the production unit in charge of computing biomarkers in CATI, the French platform for multicenter neuroimaging studies. He is now holding a research fellow position in the neuroimaging team of the **BarcelonaBeta Brain Research Center** to explore imaging early markers of **Alzheimer's disease** in large cohorts of presymptomatic subjects. By his experience both as a researcher and as an engineer, he has been building practical know-how in addressing not only the fundamental questions related to the study of Alzheimer's disease but also the many technical challenges raised by data of ever-increasing complexity.

QUALIFICATIONS

10-year experience in neuroimaging and brain data analysis
Design, implementation and production management of multi-site dataflows (data transfer, processing, quality control, communication)
Advanced knowledge of the Python language (software development and scientific computing)
Extended experience in managing large databases, big data processing and analysis in research
Excellent communication skills. Participations at international conferences and meetings, articles as first and co-author.
Supervision of students and engineers

PROFESSIONAL EXPERIENCE

Neuroimaging researcher at BarcelonaBeta Brain Research Center - Pasqual Maragall Foundation (supervisor: J-D. Gispert, PhD), Barcelona (2016 -)
Postprocessing and analysis of massive multimodal datasets, large-scale production of imaging markers in the scope of Alzheimer's disease research
Development of an XNAT-based imaging platform
Associate Professor in Diagnostic Imaging at Pompeu Fabra University

Research Engineer / Production Manager in CATI (director: J-F. Mangin, PhD), NeuroSpin (2011-2016)
Creation of a national infrastructure for the support of cohort studies on Alzheimer's patients and related dementias (http://cati-neuroimaging.com).
Multi-site coordination of analyses performed on massive collections of images.
Member of the project executive committee.
Supervision of a software development team (3) focused on quality control.
Frequent interactions with teams in charge of national and international research projects.
Supervision of training engineers (2).

Postdoctoral Research Fellow in NeuroSpin CEA Saclay, France (2010-2011)
Working on classification and computer vision methods for the study of the cortical folding process and intersubject variability in developing brain.
Supervision: J-F. Mangin, PhD

PhD Student - Graduate Teaching Assistant, Université Aix-Marseille (2005-2009)
Doctoral training in neuroimaging (Laboratoire des Sciences de l'Information et des Systèmes)
functional magnetic resonance imaging, computer vision, machine learning, optimization, shape analysis

Training Engineer, Neurology Department 1st Medicine Faculty, Charles University, Prague, Czech Republic (2004)

Design of a video movement detection system during the acquisition of fMRI data - Application to studies in fMRI and repetitive transcranial magnetic stimulation (rTMS)

EDUCATION

Ph.D. in Computer Science - Université Aix-Marseille, 2005-2009
Thesis: Structural surface-based analysis of fMRI data
Supervision: Dr. Olivier Coulon, Ph.D - Prof. Rémy Bulot, Ph.D

Master's degree, Digital Imaging - Université Aix-Marseille, 2004-2005
Thesis: From a gyral parcellation to a cortical surface parameterization
Ranked 1st of promotion

Diplôme d'Ingénieur (Biomedical Eng.), 2002-2005
Polytech-Marseille

TRAINING

Neuroanatomy (- 50 hours) - Pr D. Hasboun - Université Pierre et Marie Curie, Paris - 2013-2014

Agile software development (Scrum) (- 20 hours) - Valtech - 2014

LANGUAGES

French (native), English (full professional proficiency), Spanish (limited professional proficiency), Italian (elementary proficiency), Catalan (elementary proficiency)

COMPUTER TECHNOLOGIES

Extended knowledge of the Python language and scientific computing in Python - Knowledge of C/C++, Java
Databases (Sqlite, Postgresql) and web (server/client, JS, HTML5)
Experienced in big data technologies (machine learning, parallel computing, scalable databases)
Enthusiast Git/GitHub user
Experienced in agile project management (Scrum) and software architecture design - Enthusiast about code quality
Experienced Linux system administrator since 2004.

NEUROIMAGING SOFTWARE

Statistical Parametric Mapping (SPM), FreeSurfer, BrainVisa, XNAT, FSL, ANTs

TEACHING

Diagnostic imaging, since 2016, Pompeu Fabra University, Barcelona

Computer Science, Algorithmics, Visualization in Scientific Computing, Geometric Modeling, Pattern Recognition, Image Analysis, from 2005 to 2009, Faculté des Sciences de Luminy, Aix-Marseille University

SUPERVISION OF STUDENTS

Pauline Bezivin (2012 ; co-supervised Master student)
Samuel David (2014 ; supervised Engineering student)
Alberto Redolfi (2014 ; co-supervised Ph.D candidate)

REVIEWER ACTIVITY

International Symposium on Biomedical Imaging
Neuroimage
Organization for Human Brain Mapping (OHBM) annual meeting

RESEARCH INTERESTS

Intersubject variability
Computational anatomy
Cortical folding process, brain development, cortical morphology
Aging process and neurodegenerative diseases
Imaging markers
Multisite studies
Optimization of image processing dataflows over large cohorts
Quality Control on large databases

PROFESSIONAL INTERESTS

Machine learning
Computer vision
Software development in research

HOBBIES

Travels (Iceland, Norway, Hawai, among the most recent)
Lightweight hiking, long-distance trekking (hiking solo without assistance from Marseille to Italy in 2011, across Iceland in 2012, Mallorca in 2014, the southern Alps in 2015)
Hacking (Raspberry Pi, Arduino, attending BrainHack hackathons)
Aikido, climbing, running (2 half-marathons per year since 2010)

REFERENCES

Dr. Juan Domingo Gispert López, Ph.D (current supervisor)
Head of neuroimaging research
BarcelonaBeta Brain Research Center - Pasqual Maragall Foundation
jdgispert@fpmaragall.org

Dr. Jean-François Mangin, Ph.D (former supervisor)
Director of the CATI platform
Head of the Computer-assisted Neuroanatomy group,
NeuroSpin - Atomic Energy Commission, Saclay, France
jean-francois.mangin@cea.fr

Dr. Olivier Coulon, Ph.D. (Ph.D advisor)
Head of the MeCA group
Institut des Neurosciences de La Timone, Marseille, France
olivier.coulon@univ-amu.fr

Peer-reviewed publications :

Brugulat-Serrat, A, Salvadó, G., **Operto, G.**, Cacciaglia, R., Sudre, C., Grau-Rivera, O., Suárez-Calvet, M., Falcon, C., Sánchez-Benavides, G., Gramunt, N., Minguillon, C., Fauria, K., Barkhof, F., Molinuevo, J.L., Gispert, J.D. for the ALFA Study, White matter hyperintensities mediate gray matter volume and executive function relationship, Neurology, 2018 (submitted)

G. Operto, R. Cacciaglia, O. Grau-Rivera, C. Falcon, A. Brugulat-Serrat, P. Ródenas, R. Ramos, S. Morán, M. Esteller, N. Bargalló, J.L. Molinuevo, J.D. Gispert for the ALFA Study, White matter microstructure is altered in cognitively normal middle-aged APOE- ε 4 homozygotes, Alzheimer's Research & Therapy, 2018

Falcon, C., Tucholka, A., Monté-Rubio, G.C., Cacciaglia, R., **Operto, G.**, Rami, L., Gispert, J.D., Molinuevo, J.L., for the Alzheimer's Disease Neuroimaging Initiative, Longitudinal structural cerebral changes related to core CSF biomarkers in preclinical Alzheimer's disease: A study of two independent datasets, NeuroImage: Clinical, 2018

C. Dufouil, B. Dubois, B. Vellas, F. Pasquier, F. Blanc, J. Hugon, O. Hanon, J-F Dartigues, S. Harston, A. Gabelle, M. Ceccaldi, O. Beauchet, P. Krolak-Salmon, R. David, O. Rouaud, O. Godefroy, C. Belin, I. Rouch, N. Auguste, D. Hannequin, A. Benetos, J. Pariente, M. Paccalin, O. Moreaud, C. Hommet, F. Sellal, M. Vercelletto, I. Jalenques, A. Gentric, P. Vandel, H. Savarieau, **G. Operto**, H. Bertin, M. Chupin, V. Bouteloup, M-O Habert, J-F Mangin, G. Chêne on behalf of the Memento cohort Study Group, Cognitive and imaging markers in non-demented subjects attending a memory clinic: study design and baseline findings of the MEMENTO cohort, Alzheimer's Research & Therapy, 2017

G. Operto, M. Chupin, B. Batrancourt, M.O Habert, O. Colliot, H. Benali, C. Poupon, C. Champseix, C. Delmaire, S. Marie, D. Rivière, M. Pélégrini-Issac, V. Perlbarg, R. Trebossen, M. Bottlaender, V. Frouin, A. Grigis, D. Papadopoulos Orfanos, H. Dary, L. Fillon, C. Azouani, A. Bouyahia, C. Fischer, L. Edward, M. Bouin, U. Thoprakarn, J. Li, L. Makkaoui, S. Poret, C. Dufouil, V. Bouteloup, G. Chételat, B. Dubois, S. Lehéricy, J.F. Mangin, Y. Cointepas and the CATI Consortium, CATI: A Large Distributed Infrastructure for the Neuroimaging of Cohorts, Neuroinformatics, 2016

D. Germanaud, J. Lefèvre, C. Fischer, M. Bintner, A. Curie, V. des Portes, S. Eliez, M. Elmaleh-Bergès, D. Lamblin, S. Passemard, **G. Operto**, M. Schaer, A. Verloes, R. Toro, J.F. Mangin, L. Hertz-Pannier, Simplified gyral pattern in severe

developmental microcephalies? New insights from allometric modeling for spatial and spectral analysis of gyrification, Neuroimage, 2014

G. Operto, D. Rivière, B. Fertil, R. Bulot, J-F. Mangin, O. Coulon, Structural Analysis of fMRI Data : A Surface-Based Framework for fMRI Multi-Subject Studies, Medical Image Analysis, 2012

P. Havránková, N.D. Walker, **G. Operto**, T. Sieger, J. Vymazal, R. Jech, Cortical pattern of complex but not simple movements is affected in writer's cramp: a parametric event-related fMRI study, Clinical Neurophysiology, 2011

P. Havrankova, R. Jech, N.D. Walker, **G. Operto**, J. Tauchmanova, J. Vymazal, P. Dušek, M. Hromčík, E. Růžička, Repetitive TMS of the somatosensory cortex improves writer's cramp and enhances cortical activity, Neuroendocrinology Letters, 2010

C. Clouchoux, D. Rivière, J-F. Mangin, **G. Operto**, J. Régis, O. Coulon, Model-driven parameterization of the cortical surface for localization and inter-subject matching, Neuroimage, 2010

G. Operto, R. Bulot, J-L. Anton, O. Coulon, Projection of fMRI data onto the cortical surface using anatomically-informed convolution kernels, Neuroimage, 2008

Peer-reviewed conferences :

S. Puch, A. Aduriz, A. Casamitjana, V. Vilaplana, P. Petrone, **G. Operto**, R. Cacciaglia, S. Skouras, C. Falcon, J.L. Molinuevo, J.D. Gispert, Voxelwise nonlinear regression toolbox for neuroimage analysis: Application to aging and neurodegenerative disease modeling, Neural Information Processing Systems, Workshop on Machine Learning for Health, 2016

G. Operto, G. Auzias, A. Le Troter, M. Perrot, D. Rivière, J. Dubois, P. Hüppi, O. Coulon, J-F. Mangin,Structural Group Analysis of Cortical Curvature and Depth Patterns in the Developing Brain (accepted for oral presentation), international symposium on biomedical imaging - ISBI, Barcelona, 2012

O. Coulon, F. Pizzagalli, **G. Operto**, G. Auzias, C. Delon-Martin, M. Dojat, Two new stable anatomical landmarks on the central sulcus: definition, automatic detection, and their relationship with primary motor functions of the hand, International Conference of the IEEE Engineering in Medicine and Biology Society - EMBC, 2011

G. Operto, B. Fertil, R. Bulot, O. Coulon, Structural group analysis of brain functional data : assessing results significance, Medical Image Computing and Computer-Assisted Intervention – MICCAI - fMRI workshop, London, 2009

G. Operto, C. Clouchoux, R. Bulot, J.-L. Anton, O. Coulon, Surface-based structural group analysis of fMRI data, Medical Image Computing and Computer-Assisted Intervention – MICCAI, New York City, 2008

G. Operto, Noyaux de convolution contraints par l'anatomie pour la projection de données IRMf sur la surface corticale, Journées Du Laboratoire LSIS 2007, Giens, 2007

G. Operto, R. Bulot, J-L. Anton, O. Coulon, Anatomically informed convolution kernels for the projection of fmri data on the cortical surface , Medical Image Computing and Computer-Assisted Intervention – MICCAI, Copenhagen, 2006

Chapters in book :

C. Falcon, G. Operto, J.L. Molinuevo, J.D. Gispert. (2018) Neuroimaging Methods for MRI Analysis in CSF Biomarkers Studies. In: Perneczky R. (eds) Biomarkers for Alzheimer's Disease Drug Development. Methods in Molecular Biology, vol 1750. Humana Press, New York, NY

J-F. Mangin, M. Perrot, **G. Operto**, C. Fischer, J. Lefèvre, D. Rivière, (2015) Sulcus Identification and Labeling, In Brain Mapping, edited by Arthur W. Toga, Academic Press, Waltham, Pages 365-371, ISBN 9780123973160, http://dx.doi.org/10.1016/B978-0-12-397025-1.00307-9.

Abstracts and posters :

Petrone, P., Casamitjana, A., Falcon, C., Artigues, M., **Operto, G.**, Skouras, S., Cacciaglia, R., Molinuevo, JL, Vilaplana, V., Gispert, JD, Salvadó, G., Characteristic brain volumetric changes in the AD preclinical signature, Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 2018

Gispert, JD; Salvadó, G., Cacciaglia, R., **Operto, G.**, Falcon, C., Brugulat, A., Grau, O., Suárez-Calvet, M., Moran, S., Esteller, M., Molinuevo, JL, Reduced entorhinal gray matter volume in healthy amyloid-negative APOE-E4 homozygotes of the ALFA cohort, Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 2018

Petrone, P., Vilaplana, V., Casamitjana, A., Escobedo, D., Tucholka, A., Cacciaglia, R., **Operto, G.**, Skouras, S., Falcon, C., Molinuevo, JL, Gispert JD, Magnetic resonance imaging and machine learning make a valuable combined tool for the screening of preclinical AD, Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 2017

Operto, G., Cacciaglia, R., Falcon, C., Sánchez-Benavides, G., Gramunt, N., Moran, S., Esteller M., Crous-Bou M., Molinuevo J.L., Gispert, J. D.. Effect of age and ApoE genotypes on brain microstructure in cognitively healthy subject as measured by diffusion-weighted imaging, Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 2017

C. Dufouil, J.F. Mangin, **G Operto**, P. Amouyel, B. Dubois, B. Vellas, F. Pasquier, J.F Dartigues, M. Ceccaldi, F. Blanc, A. Gabelle, P. Krolak-Salmon, J. Hugon, O. Hanon, O. Rouaud, R. David, M. Chupin, G. Chêne for the Memento Study group, Are Alzheimer's Disease Risk Genes related to markers of brain pathology? The Memento cohort , Alzheimer's Association International Conference, 2016

G. Operto, C. Fischer, S. David, M. Bouin, L. Fillon, C. Champseix, J-F. Mangin, SnapBase/SnapCheck: Assisting Quality Control of Post-processing Results over Large Cohorts, Human Brain Mapping, Honolulu, 2015

C. Dufouil, M.Chupin, S. Auriacombe, H. Savarieau, B. Dubois, F. Pasquier, F. Blanc, J. Hugon, O. Hanon, A. Gabelle, M. Ceccaldi, O. Beauchet, P. Krolak Salmon, R. David, O. Rouaud, O. Godefroy, C. Belin, I. Rouch, D. Wallon, A. Benetos, M. Paccalin, M. Sauvée, L. Fillon, C. Hommet, F. Sellal, M. Vercelletto, I. Jalenques, A. Gentric, P. Vandel, V. Bouteloup, **G. Operto**, C. Thomas-Anterion, S. Belliard, J-F Mangin, P-J Ousset, G. Chene, Age differences in the association of white matter lesions with the occurrence of dementia: The memento cohort, Alzheimer's & Dementia, Volume 11, Issue 7, Supplement, July 2015, Pages P678-P679, ISSN 1552-5260, http://dx.doi.org/10.1016/j.jalz.2015.06.1008.

L. Edward, **G. Operto**, S. Poret, Y. Cointepas, N. Cheaib, L. Makkaoui, B. Batrancourt, OntoCATI: Towards an ontology of neuroimaging measures in the CATI Platform, Frontiers in Neuroinformatics, Stockholm, 2013

C. Fischer, **G. Operto**, S. Laguitton, M. Perrot, I. Denghien, D. Rivière, J-F. Mangin, Morphologist 2012: The new morphological pipeline of BrainVisa, Human Brain Mapping, Beijiing, 2012

G. Operto, G. Auzias, D. Rivière, J. Dubois, P. Hüppi, J-F. Mangin, Finding Stable Sulcal Subunits in Developing Brain: a Group Analysis of Cortical Curvature and Depth Maxima, Human Brain Mapping, Quebec, 2011

G. Operto, O. Coulon, A. Cachia, D. Rivière, J. Régis, J-F. Mangin, Finding Sulcal Stable Subunits : a Group Analysis of Primal Sketches of the Cortex Mean Curvature, Human Brain Mapping, Barcelona, 2010

G. Auzias, O. Colliot, J-A. Glaunès, **G. Operto**, J-F. Mangin, A. Trouvé, S. Baillet, Diffeomorphic registration of functional data using sulcal landmarks : DISCO is born to be alive, Human Brain Mapping, Barcelona, 2010

L. Favre, A.L. Fouque, T. Vincent, A. Tucholka, M. Keller, **G. Operto**, B. Thyreau, C. Clouchoux, L. Risser, A. Moreno, D. Geoffroy, Y. Cointepas, O. Coulon, P. Ciuciu, B. Thirion, A. Roche, A Comprehensive fMRI Processing Toolbox for BrainVISA, Human Brain Mapping, 2009

P. Kochunov, J. Lancaster, S. Narayana, **G. Operto**, O. Coulon, J-F. Mangin, P. Fox, Relationship between regional FDG uptake and other markers of cerebral health in normal aging, Human Brain Mapping, 2007

G. Operto, C. Clouchoux, J-L. Anton, A. Cachia, K. Dauchot, A. Sirigu, R. Bulot, O. Coulon, Cortical localization by surface parameterization : a gyrus-based approach, Human Brain Mapping, Florence, 2006

O. Coulon, C. Clouchoux, **G. Operto**, K. Dauchot, A. Sirigu, J-L. Anton, Cortical localization by surface parameterization : a sulcus-based approach, Human Brain Mapping , Florence, 2006

C. Clouchoux, O. Coulon, **G. Operto**, D. Riviere, K. Dauchot, A. Sirigu, J-L. Anton, J. Regis, Cortical localization via hemisphere surface parameterization, Human Brain Mapping, Florence, 2006

P. Havrankova, R. Jech, N. Walker, **G. Operto**, P. Dušek, J. Vymazal, Cortical involvement in active and passive motions in graphospasm , Human Brain Mapping , Florence, 2006

P. Havrankova, R. Jech, N. Walker, **G. Operto**, P. Dušek, J. Vymazal, Active and passive motion in patients with graphospasm: an event-related fMRI study, 16th International congress of Parkinson's disease and related disorders, Berlin, 2005

R. Jech, L. Nováková, N. Walker, **G. Operto**, J. Roth, J. Vymazal, E. Růžička, Postanoxický Myoklonus v Obraze Event-Related fMRI - Kazuistika , 19th Czech and Slovak Neurological Congress, Brno, 2004