CHRISTIAN-G. BÉNAR

Engineer, PhD.

ADDRESS

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PERSONAL DETAILS

Born Aug. 2, 1971, Dijon (France); French and Canadian Citizen
Married, two children (4 year old and 2 year old)

RESEARCH INTERESTS

- Statistical signal and array processing
- Source localization of epileptic spikes and other EEG events
- Simultaneous functional MRI and EEG

CURRENT POSITION

I am currently a postdoc in a collaboration between the Laboratoire de neurophysiologie et neuropsychologie of Marseille (INSERM-université Aix-Marseille, Prof. Patrick Chauvel, http://www.mediterranee.univ-mrs.fr/recherche/lab.asp?lng=fr&view=unit&id=49) and the fMRI Center of La Timone (CNRS, Dr Jean-Luc Anton, http://irmfmrs.free.fr/).

PHD THESIS

I did my Ph. D. work in the Department of Biomedical Engineering of McGill University, under the supervision of Dr. Jean Gotman. http://www.mni.mcgill.ca/research/gotman

For this work, I was nominated for the Dean's honors list (first 10% of the faculty of Medecine).

Title: Combining Electroencephalography and Magnetic Resonance Imaging in the Investigation of epileptic Discharges

The topic of our doctoral research was the improvement of techniques aimed at localizing the sources of epileptic discharges. The main goal was to improve pre-surgical evaluation in refractory epilepsy. A second goal, more research-oriented, was to offer new insights into the mechanisms of epilepsy. We proposed to combine the good spatial resolution of functional MRI and the excellent temporal resolution of EEG. This was done with the help of simultaneous recording of EEG and fMRI on one hand and EEG source localization on the other hand.

Our original contributions were:
- to evaluate the impact of modeling post-surgical defects in EEG source localization
- to establish a non-uniform EEG spatial sampling method
- to establish a method to produce statistical maps of EEG sources
- to measure the BOLD response to epileptic discharges

EDUCATION

1998-2004:	Dept of Biomedical Engineering, McGill University, Montréal, Canada Graduate courses in Biomedical Engineering, Electrical Engineering and Medicine. This included: Central Nervous System (mark: 89%, or 17.8/20), Image Processing, and Biomedical Signal Processing.
1991-94:	Ecole Supérieure d'Electricité (Supélec), Paris and Metz, France Engineering studies. Specialization in digital signal processing, image processing and pattern recognition ("Signaux, Image et Formes").
1989-91:	Lycée Carnot, Dijon, France Preparatory classes for engineering schools, majoring in physics (P').
1989:	Lycée Carnot, Dijon, France Achieved "Baccalauréat C" (math, physics) with high honors ('Mention Très Bien')

WORK EXPERIENCE

1995-97:	Stellate Systems (Montréal) Software engineer. Development of electroencephalogram detection algorithms and analysis tools (Visual C++, Active X).
1994-95:	Institut de Médecine Navale (CERB-IMNSSA), Toulon, France Member of the scientific contingent within the Neuroscience Group, under the supervision of Dr. Franck Vidal. Setting up of an experimental procedure to analyze electroencephalograms (evoked potentials, Neuroscan software).
Apr-Jun 94:	Philips Laboratories of Electronics (LEP), Paris, France End of studies research project. Development of an automatic classifier of moiré images, using image processing (C language, Khoros software) and neural networks.
Jul-Aug 93:	Procter & Gamble Health and Beauty Care, London, England Internship. Development of information systems (Excel macros, DOS) setting up flows of financial data, destined for European Brand managers (GB, France, Germany) and top managers.
Jul 92:	Télémécanique factory (electrical systems and automation), Dijon, France Quality control of parts.

OTHER EXPERIENCE

1998: Nine months stay in South America (Bolivia, Brazil, Argentina, Chile).
- Technical support to epilepsy laboratories in Brazil and Argentina.
- Running of Digital Signal Processing seminars at the Universidade de Bahia (Brazil) and the Universidad Mayor de San Simon (Bolivia).
- Volontary work in a street kids center in Salvador de Bahia.

1991-92 Responsible for relations with firms within the student organization of Supélec. Member of the organizing team for the school gala (1500 people, budget $50000)

LANGUAGES

French:	Mother tongue
English:	Read, spoken, written fluently (TOEFL 1992: 637)
Portuguese:	Good speaking and reading
Spanish:	Good speaking and reading
Computer:	Visual C++, Matlab, Windows and UNIX environments

OTHER ACTIVITIES

Traveling (Latin America, Europe); music (piano, percussion, guitar; jazz, Brazilian popular music)

SOCIETIES

2001-2003: Student member of the IEEE – Engineering in Medicine and Biology Society

REVIEWING

2004: Invited reviewer for Clinical Neurophysiology

AWARDS AND HONORS

2004: Price for poster presentation, XXVIth Annual Symposium of the Centre for Research in Neurological Sciences, Montreal

2003: MNI-GSA travel award for NFSI 2003

NIH Human Brain Project: Trainee Travel Fellowship for the 9th International Conference on Human Brain Mapping: HBM2003

2002: Price for oral presentation, 4th International Conference on Bioelectromagnetism, Montreal

NIH Human Brain Project: Trainee Travel Fellowship for the 8th International Conference on Human Brain Mapping: HBM2002

2001: Three-year doctoral student award, Canadian Institutes of Health Research (CIHR). Value: 57000 CA$.

1999: Travel award from the Geddes fund, McGill Dept of Biomedical Engineering.

1998: Two-year Master's Student award from the National Sciences and Engineering Research Council of Canada (NSERC). Value: 48000 CA$.

SCIENTIFIC PUBLICATIONS

Peer-reviewed papers

Bénar CG, Grova C, Kobayashi E, Bagshaw AP, Aghakhani Y, Dubeau F, Gotman J FMRI responses an EEG source localization contribute to the definition of the epileptic region, *submitted*

Bénar CG, Gunn RN, Grova C, Champagne B, Gotman J. Statistical maps for EEG dipolar source localization. *IEEE Trans Biomed Eng.* 2005 Mar;52(3):401-13.

Bagshaw AP, Hawco C, **Bénar CG**, Kobayashi E, Aghakhani Y, Dubeau F, Pike GB, Gotman J. Analysis of the EEG-fMRI response to prolonged bursts of interictal epileptiform activity. *Neuroimage.* 2005 Feb 15;24(4):1099-112.

Gotman J, **Bénar CG**, Dubeau F. Combining EEG and fMRI in Epilepsy: Methodological Challenges and Clinical Results. *J Clin Neurophysiol.* 2004 Jul-Aug;21(4):229-40., invited review

Bagshaw AP, Aghakhani Y, **Bénar CG**, Kobayashi E, Hawco C, Dubeau F, Pike GB, Gotman J. EEG-fMRI of focal epileptic spikes: analysis with multiple haemodynamic functions and comparison with gadolinium-enhanced MR angiograms. *Hum Brain Mapp.* 2004 Jul;22(3):179-92.

Aghakhani Y, Bagshaw AP, **Bénar CG**, Hawco C, Andermann F, Dubeau F, Gotman J. fMRI Activation during Spike and Wave Discharges in Idiopathic Generalized Epilepsy. *Brain* 2004 May;127(Pt 5):1127-44.

Kang JK, **Bénar C**, Al-Asmi A, Khani YA, Pike GB, Dubeau F, Gotman J. Using patient-specific hemodynamic response functions in combined EEG-fMRI studies in epilepsy. *Neuroimage* 2003 Oct;20(2):1162-70.

Al-Asmi A, **Bénar CG**, Gross DW, Khani YA, Andermann F, Pike B, Dubeau F, Gotman J. fMRI Activation in Continuous and Spike-triggered EEG-fMRI Studies of Epileptic Spikes. *Epilepsia* 2003;44(10):1328-39.

Bénar CG, Aghakhani Y, Wang Y, Izenberg A, Al-Asmi A, Dubeau F, Gotman J. Quality of EEG in Simultaneous EEG-fMRI for Epilepsy. *Clin Neurophysiol* 2003;114(3):569-80..

Bénar CG, Gross DW, Wang Y, Petre V, Pike B, Dubeau F, Gotman J. The BOLD Response to Interictal Epileptiform Discharges. *Neuroimage* 2002; 17, 1182-1192

Bénar CG, Gotman J. Modeling of post-surgical brain and skull defects in the EEG inverse problem with the boundary element method. *Clin Neurophysiol* 2002;113(1):48-56

Platform presentations

Probabilistic methods in the EEG inverse problem. *4th Int Conf on Bioelectromagnetism*, Montréal, July 2002

Simultaneous EEG and fMRI in epileptic discharges: BOLD response and localization. *8th Intl Conference on Functional Mapping of the Human Brain*, Sendai, June 2002

Conference papers

Bénar CG, Gunn RN, Grova C, Champagne B, Gotman J. FMRI and EEG dipole statistical maps in epilepsy: developing models. *Proc 4th Int Symposium on noninvasive functional source imaging within the human brain and heart*, Chieti, Sep 2003

Bénar CG, Gunn RN, Champagne B, Gotman J. Probabilistic methods for the EEG inverse problem. *4th International Conference on Bioelectromagnetism*, Montréal July 2002

Bénar CG, Gotman J. Non-uniform spatial sampling in EEG source analysis. *Proc. 23rd annual Conf. IEEE-EMBS* Oct. 2001

Abstracts & Posters

Bénar CG, Agha Khani Y., Kobayashi E, Bagshaw A, Grova C, Dubeau F, Gotman J. Simultaneous EEG-fMRI of Epileptic Spikes: Comparison of fMRI and EEG Statistical Maps with Intracranial Recordings. *10th Annual Meeting of the Organization for Human Brain Mapping*, Budapest, June 2004

Bénar CG, Bagshaw A, Grova C, Agha Khani Y., Kobayashi E, Dubeau F, Gotman J. Combination of EEG and functional MRI in the Investigation of Epileptic Spikes. *XXVIth Annual Symposium of the Centre for Research in Neurological Sciences*, Montreal May 2004

Bénar CG, Gunn RN, Agha Khani Y, Bagshaw A, Champagne B, Gotman J. EEG Statistical Maps of Localization of Epileptic Spikes: a Tool for Comparison with fMRI and SEEG. *9th Annual Meeting of the Organization for Human Brain Mapping*, New York, June 2003

Bénar CG, Gross DW, Wang Y, Petre V, Pike B, Dubeau F, Gotman J. The BOLD Response to Interictal Epileptiform Discharges. *Int Conf of the American Epilepsy Society* 2001

Bénar CG, Gotman J. Modeling of Skull and Brain Defects in the EEG Inverse Problem with the Boundary Element Method. *6th Int Conf on Functional Mapping of the Human Brain*, San Antonio 2000

Bénar CG, Gotman J, Feasibility and Effect of Modeling Post-surgical Brain and Skull Defects in the EEG Inverse Problem. *Int Conf of the American Epilepsy Society* 2000