Victor Barrès

CONTACT INFORMATION

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Neuroscience Graduate Program
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RESEARCH INTERESTS

Computational cognitive science, computational neuroscience, neurolinguistics, cognitive linguistics, construction grammar, visual attention, artificial intelligence, natural language processing, EEG.

EDUCATION

University of Southern California, Los Angeles, California USA

Ph.D. candidate, Neuroscience, September 2010 (expected graduation date: May 2017)

- Dissertation Topic: "Visual Attention, Meaning, and Grammar: Neuro-Computational Modeling of Situated Language Use."
- Advisor: Michael A. Arbib

M.S., Neuroscience

Ecole Normal Superieur & Ecole des Hautes Etudes en Sciences Sociales, Paris, France.

M.S., Cognitive Science, August, 2010

- Dissertation Topic: "Investigating audio-visual interactions in binocular rivalry: fate of the suppressed percept and modulation of volitional control."
- Advisor: Manuel Vidal & Jacques Droulez
  Laboratoire de Physiologie de la Perception et de l'Action, College de France.

Ecole Polytechnique, Palaiseau, France.

M.S., Physics, June, 2006

Classes Préparatoires Lycée Louis le Grand, Paris, France.

B.S., Mathematics, Physics, and Chemistry, June, 2003.

HONORS AND AWARDS

University of Southern California Final Year Dissertation Fellowship. **2016 - 2017**

University of Southern California Provost's Ph.D. Fellowship. **2010 - 2014**

ACADEMIC EXPERIENCE

Ph.D. Candidate **September, 2010 - Present**
Includes current Ph.D. research, Ph.D. and Masters level coursework and research projects. University of Southern California, Neuroscience Graduate Program, Los Angeles, CA, USA.

Research Symposium Co-organizer
Action Brain Language and Evolution Symposium, Los Angeles, California. **January 2014**
Action, Language and Neuroinformatics Symposium, Los Angeles, California. **July 2011**

Teaching Assistant
USC Viterbi School of Engineering - Department of Computer Science
Brain Theory and Artificial Intelligence (CS 564). **January, 2013 - June, 2015**
Duties include: Homework design and grading. Office hours. Giving programming-oriented lectures (including using Simulink to model brain systems and using/developing neuroinformatics databases). Lecture on construction grammar and the computational neuroscience of vision-language interactions.
Applied Natural Language Processing (CS 544) **January, 2013 - June, 2013**
Duties included: Homework final research project grading. Office hours. Lecture on Principal component

analysis and dimensionality reduction in vector space models.
http://www.isi.edu/natural-language/teaching/cs544/spring13

Research Assistant
College de France, LPPA, Paris, France. **September, 2009 - August, 2010**
Under the direction of Manuel Vidal & Jacques Droulez. Responsibilites included: Designing, carrying out, analyzing and publishing the results of a psychophysics experiment involving use of a head mounted virtual reality display.
Results are published in: Vidal, M., & Barrès, V. (2014) (see below)

UCSF, Gazzaley lab, San Francisco, CA, USA. **June, 2009 - September, 2009**
Under the direction of Adam Gazzaley and Ted Zanto.
Responsibilites included: MRI scanning (structural and functional), EEG recording, TMS, experiment design, subjects recruitment.
The work resulted in two publications including one in Nature Neuroscience.

PUBLICATIONS

Arbib, M. A., Gasser, B., & **Barrès, V.** (2014). Language is handy but is it embodied? Neuropsychologia, 55, 57-70.

Barrès, V., Lee, J. (2014). Template Construction Grammar: from visual scene description to language comprehension and agrammatism. Neuroinformatics, 1-28.

Vidal, M., **Barrès, V.** (2014). Hearing (rivaling) lips and seeing voices: how audiovisual interactions modulate perceptual stabilization in binocular rivalry. Frontiers in Human Neuroscience, 8.

Arbib, M. A., **Barrès, V.** (2013). Are Grammatical Constructions Linked to Embodied Meaning Representations? IEEE CIS Autonomous Mental Development Newsletter Fall 2013

Barrès, V., Simons III, A., & Arbib, M. A. (2013). Synthetic event-related potentials: A computational bridge between neurolinguistic models and experiments. Neural Networks, 37, 66-92.

Vidal, M., **Barrès, V**. (2011). How Auditory Information Influences Volitional Control in Binocular Rivalry: Modulation of a Top-Down Attentional Effect. I-Perception, 2(8), 839-839.

PAPERS IN PREPARATION

Barrès, V., Lee, J., Arbib, M.A. (in preparation). SALVIA: An Implemented Schema-Theoretic Framework for Investigating the Linkage of Vision and Language.

Barrès, V., Lee, J., Arbib, M.A. (in preparation). From gaze patterns to utterances:
Modeling the dynamics of visual scene description.

Barrès, V. (in preparation). Template Construction Grammar: A Brain Theory Based Computational Construction Grammar.

Barrès, V. (in preparation). Modeling the Dynamic Online Interactions of Visual, Pragmatic, and Linguistic Knowledge During Situated Language Comprehension.

Barrès, V. (in preparation). Computational Construction Grammars: A Comparative Review.

CONFERENCE PRESENTATIONS

Barrès, V. 2015. Modeling Performance Based on Construction Grammar: Challenges for Integration. Action Brain Language and Evolution (ABLE) Workshop, Chicago, USA, October, 2015

Barrès, V. 2014. Template Construction Grammar: Neuro-Computational Modeling of the Vision-Language Interface . Cluster of Excellence Cognitive Interaction Technology (CITEC) & Action Brain Language and

Evolution (ABLE) Workshop, Bielefeld, Germany, December, 2014

Barrès, V. 2014. Neuro-Computational Modeling of the Language-Vision Interface: Construction Grammar, Visually Anchored Semantics, and Neural Architecture. Action Brain Language and Evolution (ABLE) Workshop, Los Angeles, USA, January, 2014

Lab Presentations

Barrès, V. 2014. From Visual Scenes to Utterances and Back: (Neuro)Computational Modeling of the Vision-Language Interactions. At Luc Steel's Sony Laboratory, Paris, France, March, 2014

Barrès, V.. 2014. From Visual Scenes to Utterances and Back: (Neuro)Computational Modeling of the Vision-Language Interactions. At Peter Dominey's Robot Cognition Laboratory, Lyon, France, March, 2014

Conference Posters

Barrès, V., & Arbib, M.A. 2015. Visual Attention, Meaning, and Grammar: Neuro-Computational Modeling of Situated Language Use. Society for the Neurobiology of Language conference, Chicago, USA, 2015

Barrès, V., & Arbib, M.A. 2013. Matching Utterances with Visual Scenes: Neuro-Computational Investigation of the Language-Vision Interface, Neurobiology of Language Conference, San Diego, USA, 2013

Barrès, V., Simons, A., Tiruvoimozhi, A., & Arbib, M.A. 2012. Synthetic ERP: Bridging the Gap between Conceptual and Conceptual Models in Neurolinguistics, Society For Neuroscience conference, New Orleans., USA, 2012

Oh, Y., **Barrès, V.**, Kim, S., Lee, & J-Y, Schweighofer, N. 2011. Design of Individual Motor Training Schedules Based on Prediction of Long-term Retention, Society For Neuroscience conference, Washington D.C., USA, 2011

Barrès, V., Lee, J., & Arbib, M.A. 2011. Template Construction Grammar (TCG) as a Model of Comprehension: Linking Syntax to Light and Heavy Semantics, Neurobiology of Language Conference, Baltimore, USA, 2011

Professional and Volunteering Experience

Presenter, Los Angeles Brain Bee. **January, 2016**
Demonstration and explanation of visual illusions.

Webmaster Neuroscience Graduate Forum **2015 - 2016**
Webmaster for the USC neuroscience graduate student association.

Judge, California State Science Fair **2015 - 2016**
Judge at in the cognitive science section, Los Angeles, CA, USA.

High School Mentor Volunteer **Summer 2014**
Mentor a high school student for the USC Young Researchers Program.
Taught neuroscience, abstract neural networks (reservoir computing), basic linguistics, and programming (Python).

Co-organizer of first OpenScienceLA event **July 2013**
Co-Organizer of HackYourPhD first OpenScienceLA meeting focusing on fostering new opportunities to build open science initiatives in the Los Angeles area.
https://storify.com/HackYourPhd/hyphdus-openscience-meetup-in-los-angeles-13-7-18

Co-Organizer/Co-Founder, Neuroscience Program Distinguished Speaker Series **2012 - 2013**

Group in charge of organizing neuroscience conferences featuring high-profile researchers.

Organizer Cognitive Neuroscience Journal Club **2012 - 2013**
Weekly research journal club, USC, Neuroscience Graduate Program, Los Angeles, CA ,USA.

Organizer Computational Neuroscience Journal Club **2011 - 2012**
Weekly research journal club, USC, Neuroscience Graduate Program, Los Angeles, CA ,USA.

Journalist at Kenya Times, Nairobi, Kenya **October, 2008, February, 2009**
Writing daily article on the international mediation led by Kofi Annan following the civil unrest that erupted in Kenya in the wake of the contested 2008 presidential elections.

Volunteer at Coup de Pouce aux Sans Abris, Paris, France **October, 2007, February, 2010**
Volunteered weekly at a soup kitchen, organizing food collections annually.
http://www.coupdepouceauxsansabri.org/

COMPUTER SKILLS

- Languages: Main work done in Python, Matlab & Simulink. Some experience with C, C++, and Java.
- Database: json, XML, some experience with SQL, MySQL.
- Web: HTML, javascript, php, CSS.
  Tools: Apache, some experience with AWS.
- Other: Git, GitHub, LaTeX, Adobe Illustrator, common Windows database, spreadsheet, and presentation software.
- Algorithms: Dynamic programming (various types of chart parsers), Unification algorithms (applied to feature structures in parsing), classic neural net algorithms but including also experience with reservoir computing, Kalman filters, experience and good understanding of most of the classic ML algorithms including deep-learning but those were not at the core of my research.
- Operating Systems: Ubuntu/Linux, Windows, Mac OS.

LANGUAGES

French (Native proficiency), English (Bilingual proficiency), Spanish (Professional working proficiency), German (Elementary proficiency), Swahili (Elementary proficiency).