Clément Moulin-Frier

PhD in Engineering of Cognition, Interaction, Learning and Creation

27th may 1981
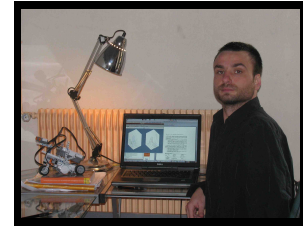33 years
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Positions

2015-
(1 year)

Post-doctoral researcher. SPECS laboratory, Universat Pompeu Fabra, Barcelona, Spain.
▷ *Contract starting in January 2015 for 1 year, under the supervision of Paul Verschure.*

2013-2014
(14 months)

Research associate. INRIA Bordeaux Sud-Ouest, Flowers team, Bordeaux, France.
▷ *See "Research Projects" section for details.*

2012-2013
(20 months)

Post-doctoral researcher. INRIA Bordeaux Sud-Ouest, Flowers team, Bordeaux, France.
▷ *See "Research Projects" section for details.*

2011
(4 months)

Post-doctoral researcher. Laboratoire de Physiologie de la Perception et de l'Action, Collège de France CNRS, Paris, France.
▷ *See "Research Projects" section for details.*

Education

2007–2011
(4 years)

PhD student in Engineering of cognition, interaction, learning and creation (defended on the 06/15/2011). Grenoble University, GIPSA-Lab, Speech and Cognition Dpt (former ICP), Grenoble, France.
▷ *See "Research Projects" section for details.*

2009
(6 months)

Visiting scholar. Brain Project, University of Southern California, Los Angeles, USA.
▷ *See "Research Projects" section for details.*

2006–2007
(1 years)

Master degree in Cognitive Science. Grenoble Institute of Technology.
▷ *with distinction.*

2004–2006
(2 years)

Master degree in Computer Science. Université Joseph Fourier, Grenoble.
▷ *Speciality: Intelligence, Interaction, Information.*
▷ *with distinction.*

2000–2004
(4 years)

Bachelor degree in Computer Science. Université Joseph Fourier, Grenoble.
▷ *Mathematics and computer science applied to science.*

2000

Scientific Baccalauréat (High School Diploma), specialized in Mathematics. Lycée des Eaux-Claires, Grenoble.
▷ *with distinction.*

Teaching

2014
(3 months)
Master project supervision. Inria Bordeaux Sud-Ouest, Flowers team.
Subject: Learning the manipulation of flexible tools in developmental robotics: a fishing robot
▷ *Student: Marie-Morgane Paumard, Ecole Normale Supérieure de Cachan.*

2013
(3 months)
Master project supervision. Inria Bordeaux Sud-Ouest, Flowers team.
Subject: Emergent maturations in early vocal development
▷ *Student: Jules Brochard, Ecole Normale Supérieure de Cachan.*

2010–2011
(1 year)
Teaching assistant in Computer Science. UFR IMAG (Computer Science and Applied Mathematics), Université Joseph Fourier, Grenoble, France.
92 hours of teaching
▷ *Bachelor and Master degrees.*

2010
(6 months)
Master project supervision. GIPSA-Lab, Grenoble Institute of Technology.
Subject: A computational model to study quantitatively motor, sensory, and sensorimotor model responses in Speech Recognition
▷ *Student: Raphaël Laurent, Master MoSIG, ENSIMAG..*
▷ *Related publications: [Laurent et al., 2013, Moulin-Frier et al., 2012, Moulin-Frier et al., 2011a].*

2007–2010
(3 years)
Teaching assistant in Computer Science. Département d'Informatique Pédagogique, Université Stendhal, Grenoble, France.
192 hours of teaching
▷ *3 years of teacher training. Best teaching project of Grenoble CIES: Third prize in 2009.*

Awards

2014
Competitive exam for CNRS (French national research council): second place among 53 international researchers.
▷ *Category: Associate scientist 2nd class. Perception and cognition, modeling and speech or vision processing.*
▷ `http://intersection.dsi.cnrs.fr/intersection/resultats-cc-en.do?campagne=55&conc=07/05&phase=ADMISSION`.

2014
Invited talk at Humanoids 2014, Madrid, Spain.
▷ *Workshop Active Learning in Robotics: Exploration Strategies in Complex Environments.*

2012
Best paper Award. International Conference on Development and Learning, ICDL/Epirob, San Diego, USA.
▷ *Category Computational models of development.*
▷ *Paper:* Curiosity-driven phonetic learning *[Moulin-Frier and Oudeyer, 2012].*

2012
Accreditation to teach at the university level. French ministry of research.
▷ *Domain: Computer Science.*

2009
Best teaching project of Grenoble CIES.
▷ *Third prize.*

2008
Rhône-Alpes region scholarship Explora-doc.
▷ *Funding for a 6-months visit in at the University of Southern California, Los Angeles, USA.*

Software Development

2014
Explauto: an open-source Python library to implement curiosity-driven learning in robotic agents. Flowers Team, Inria, Bordeaux, France.
▷ *available at* `https://github.com/flowersteam/explauto`.

Research Projects

January 2012- November 2014 (34 months)

Post-doctoral researcher and research associate (Inria). INRIA Bordeaux Sud-Ouest, Flowers team, Bordeaux, France.
Research: Developmental robotics applied to language acquisition modeling.
▷ *Related publications: all publications cosigned with Pierre-Yves Oudeyer in the "Publications" section.*
▷ *Funding: ERC Starting Grant EXPLORERS 240 007.*

2011 (4 months)

Post-doctoral researcher (CNRS). Laboratoire de la Physiologie de la Perception et de l'Action, Collège de France, Paris, France.
Research: Probabilistic model of bipedal walking control.
▷ *Journal paper: [N'Guyen et al., 2013].*
▷ *Funding: ROMEO project, French government.*

2007–2011 (3 years)

PhD student in Engineering of cognition, interaction, learning and creation. GIPSA-Lab, Speech and Cognition Dpt (former ICP), Grenoble Institute of Technology.
Research: Computational modeling of perception-action links in speech communication and phonological system emergence.
▷ *Advisors: Jean-Luc Schwartz (CNRS Research Director, GIPSA-Lab, Grenoble, France), Julien Diard (CNRS Researcher, LPNC, Grenoble, France) and Pierre Bessière (CNRS Research Director, LIG-Lab, Grenoble, France).*
▷ *Committee: Jacques Droulez (LPPA Collège de France, Paris), Yves Laprie (Loria, Nancy, France), Michael A. Arbib (USC, Los Angeles, USA) Pierre-Yves Oudeyer (INRIA, Bordeaux, France), Augustin Lux (Grenoble-INP, INRIA, France).*
▷ *Related publications: all publications cosigned with Jean-Luc Schwartz in the "Publications" section and [Moulin-Frier, 2011].*
▷ *Funding: French ministry research scholarship.*

2009 (6 months)

Visiting Scholar. University of Southern California, USC Brain Project, Los Angeles.
Research: Computational modeling of foreign accent perception and implications on the Motor Theory of Speech Perception.
▷ *Advisor: Pr. Michael A. Arbib, Professor, University of Southern California, Los Angeles, USA.*
▷ *Journal paper: [Moulin-Frier and Arbib, 2013].*
▷ *Funding: Rhône-Alpes region scholarship.*

2007 (6 months)

Master degree research project. GIPSA-Lab, Speech and Cognition Dpt (former ICP), Grenoble Institute of Technology.
Research: Deictic games within a society of sensorimotor agents in interaction.
▷ *Advisors: same as my PhD thesis.*
▷ *Related publication: [Moulin-Frier, 2007].*

2006 (6 months)

Master degree research project. LIG-Lab (former CLIPS), Université Joseph Fourier, Grenoble.
Research: Communicating Objects: the Traceability.
▷ *Advisors: Yves Demazeau (CNRS Research Director, LIG-Lab, Grenoble), Jean Caelen (CNRS Research Director, LIG-Lab, Grenoble) and Christian Perrot (CNRS Research Assistant, LIG-Lab, Grenoble).*
▷ *Related publication: [Moulin-Frier, 2006].*

2005 (6 months)

First year Master degree research project. TIMA Laboratory, Université Joseph Fourier, Grenoble 1.
Research: Synchronous circuit desynchronization.
▷ *Advisor: Marc Renaudin (Professor on secondment at Grenoble Institute of Technology and co-fouder of the Tiempo company).*

Publications

Book Chapter

Moulin-Frier, C., Schwartz, J., Diard, J., and Bessière, P. (2011b). *Primate communication and human language: Vocalisations, gestures, imitation and deixis in humans and non-humans*, chapter Emergence of articulatory-acoustic systems from deictic interaction games in a "Vocalize to Localize" framework. Advances in Interaction Studies' series by John Benjamins Pub. Co.

International Journals

Moulin-Frier, C., Nguyen, S. M., and Oudeyer, P.-Y. (2013). Self-organization of early vocal development in infants and machines: The role of intrinsic motivation. *Frontiers in Psychology (Cognitive Science)*, 4(1006).

Moulin-Frier, C. and Arbib, M. A. (2013). Recognizing speech in a novel accent: The motor theory of speech perception reframed. *Biological Cybernetics*, 107 (4):421–447.

N'Guyen, S., Moulin-Frier, C., and Droulez, J. (2013). Decision Making under Uncertainty: A Quasimetric Approach. *PLoS ONE*, 8(12):e83411.

Laurent, R., Moulin-Frier, C., Bessière, P., Schwartz, J.-L., and Diard, J. (2013). Integrate yes, but what and how? a computational approach of sensorimotor fusion in speech. *Commentary in Behavioral and Brain Sciences*, FirstView:36–37.

Moulin-Frier, C., Laurent, R., Bessière, P., Schwartz, J.-L., and Diard, J. (2012). Adverse conditions improve distinguishability of auditory, motor and perceptuo-motor theories of speech perception: an exploratory Bayesian modeling study. *Language and Cognitive Processes*, 27(7-8, Special Issue: Speech Recognition in Adverse Conditions):1240–1263.

International conferences

Moulin-Frier, C., Rouanet, P., and Oudeyer, P.-Y. (2014). Explauto: an open-source python library to study autonomous exploration in developmental robotics. In *International Conference on Development and Learning, ICDL/Epirob, Genova, Italy*

Moulin-Frier, C. and Oudeyer, P.-Y. (2013a). Exploration strategies in developmental robotics: A unified probabilistic framework. In *International Conference on Development and Learning, ICDL/Epirob, Osaka, Japan*, pages 1–6

Moulin-Frier, C. and Oudeyer, P.-Y. (2013b). Learning how to reach various goals by autonomous interaction with the environment: unification and comparison of exploration strategies. In *1st Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM2013), Princeton University, New Jersey.*

Moulin-Frier, C. and Oudeyer, P.-Y. (2013c). The role of intrinsic motivations in learning sensorimotor vocal mappings: a developmental robotics study. In *Proceedings of Interspeech, Lyon, France*, Lyon, France

Moulin-Frier, C. and Oudeyer, P.-Y. (2012). Curiosity-driven phonetic learning. In *International Conference on Development and Learning, Epirob, San Diego, USA. Best paper award.*.

Moulin-Frier, C., Laurent, R., Bessière, P., Schwartz, J., and Diard, J. (2011a). Noise and inter-speaker variability improve distinguishability of auditory, motor and perceptuo-motor theories of speech perception : An exploratory bayesian modeling study. In *9th International Seminar on Speech Production, ISSP'11*, Montral, Canada.

Arbib, M. A. and Moulin-Frier, C. (2010). Recognizing speech in a novel accent: The motor theory of speech perception reframed. In *Neurobiology of Language Conference, San Diego, USA.*

Moulin-Frier, C., Schwartz, J., Diard, J., and Bessière, P. (2010). A unified theoretical bayesian model of speech communication. In *1st conference on Applied Digital Human Modeling, Miami, USA.*

Moulin-Frier, C., Schwartz, J., Diard, J., and Bessière, P. (2008b). Emergence of a language through deictic games within a society of sensori-motor agents in interaction. In *8th International Seminar on Speech Production, ISSP'08*, Strasbourg, France.

Moulin-Frier, C., Schwartz, J., Diard, J., and Bessière, P. (2008a). Emergence du langage par jeux déictiques dans une société d'agents sensori-moteurs en interaction. In *27e Journées d'Etudes sur la Parole, JEP'2008*, Avignon France.

Workshops

Moulin-Frier, C., Schwartz, J., Diard, J., and Bessière, P. (2008c). Emergence of a language through deictic games within a society of sensori-motor agents in interaction. In *International Workshop on "Speech and Face to Face Communication"*, Grenoble France.

Schwartz, J., Rochet-Capellan, A., and Moulin-Frier, C. (2007). Speech at reach of hand and mouth: Theoretical arguments, experimental facts and computational advances. In *Workshop " Vocoid – Vocalization, COmmmunication, Imitation and Deixis in adult and infant human and non human primates "*, Grenoble France.

Theses

Moulin-Frier, C. (2011). *Rôle des relations perception-action dans la communication parlée et l'émergence des systèmes phonologiques :étude, modélisation computationnelle et simulations.* PhD thesis, Université de Grenoble.

Moulin-Frier, C. (2007). Jeux déictiques dans une société d'agents sensori-moteurs en interaction. Master's thesis, Grenoble-INP.

Moulin-Frier, C. (2006). Objets communicants : la traçabilité. Master's thesis, Université Joseph Fourier, Grenoble.

Target journal paper in a special issue, under review

Moulin-Frier, C., Diard, J., Schwartz, J.-L., and Bessière, P. (SUB). COSMO ("Communicating about Objects using Sensory-Motor Operations"): a Bayesian modeling framework for studying speech communication and the emergence of phonological systems. *Journal of Phonetics.*

Program chair and Reviewing

2015	PROGRAM CHAIR. INTERNATIONAL CONFERENCE ON DEVELOPMENT AND LEARNING, ICDL/EPIROB, 2015. ▷ *Proposition from Matthew Schlesinger, Southern Illinois University.*
2009–2014	REVIEWER. ▷ *PLoS One, Adaptive Behavior, Interaction studies, Transactions in Autonomous Mental Development, ICDL/Epirob conference.*

Skills

MD: Master degree. **BD:** Bachelor degree.

Developmental Robotics Artificial curiosity, intrinsic and extrinsic motivations, self-organization of autonomous mental development, sensorimotor exploration, learning and control, optimization, movement generation, dynamical systems.

Artificial Intelligence (MD) Bayesian learning and inference, multi-agents systems, computer vision, knowledge representation, logic and inference automation, neural networks, dimensionality reduction.

Cognitive Science (MD) Language evolution and development, speech communication, memory models and learning, neurophysiology, cerebral imaging, cognitive psychology, linguistics, pragmatics.

Computer Science (MD) Advanced compiler techniques, code optimization, program proof, complexity and computability theory, quantum information science.

Technical computing (MD) Computer programming (including C, C++, Python, JAVA, MatLab, ADA, VHDL, LISP, CAML, ProLog), graphical programming (Xwindow, java awt, OpenGL), software and hardware architectures, system-on-chip, advanced databases.

Other skills (BD) Mathematics, signal processing, control theory, thermodynamics, mechanics.

Languages French (native language), English (6-months residence in USA).

Leisures

Traveling (most European countries, USA, Japan, Thailand, Cambodia), music (some personal electronic compositions), books and movies (scientific, philosophical and political essays, science fiction).

Recommandations

Pierre-Yves Oudeyer INRIA Research Director, Head of the Flowers team, Bordeaux, France.
PhD thesis reviewer and post-doc advisor. Specialized in developmental robotics.
Pierre-Yves.Oudeyer@inria.fr

Jean-Luc Schwartz CNRS Research Director, GIPSA-Lab, Speech and Cognition Dpt, Grenoble, France.
PhD thesis advisor. Specialized in speech science.
Jean-Luc.Schwartz@gipsa-lab.grenoble-inp.fr

Pierre Bessière CNRS Research Director, LPPA lab Collège de France, Paris and LIG-Lab, e-Motion team, Grenoble, France.
PhD thesis co-advisor. Specialized in computer and cognitive sciences.
Pierre.Bessiere@college-de-france.fr

Michael A. Arbib Professor, USC Brain Project, University of Southern California, Los Angeles, USA.
Collaborator and PhD thesis reviewer. Specialized in computational neuroscience and language evolution.
arbib@usc.edu

Jacques Droulez CNRS Research Director, Head of the Active perception and exploration of objects team, LPPA lab Collège de France, Paris, France.
PhD thesis reviewer and post-doc advisor. Specialized in robotics and computer science.
Jacques.Droulez@college-de-france.fr

Anne Warlaumont Head of the Emergence of Communication Lab, UC Merced, USA.
Collaborator. Specialized in computational models of speech acquisition.
awarlaumont2@ucmerced.edu

Julien Diard CNRS Researcher, LPNC, Grenoble, France.
PhD thesis advisor. Specialized in computer and cognitive sciences.
Julien.Diard@upmf-grenoble.fr

Marc Renaudin Professor on secondment at Grenoble Institute of Technology and co-founder of the Tiempo company.
Master advisor. Specialized in microelectronics.
Marc.Renaudin@tiempo-ic.com

Christian Perrot CNRS Engineer.
Master advisor. Specialized in research promotion.
Christian.Perrot@imag.fr