Massimiliano (Max) Garagnani **D.O.B.: ##############** **Nationality: Italian**

EDUCATION

Ph.D. in Cognitive Neuroscience – Medical Research Council, Cognition & Brain Sciences Unit, University of Cambridge (UK). Date of award: 28th November, 2009. Supervisor: Prof. Friedemann Pulvermüller.

Ph.D. in Artificial Intelligence – Dept. of Computer Science, Durham University (UK). Date of award: Dec. 1999. Thesis: "*Belief Systems for Persuasive Discourse Planning*". Supervisors: Dr. M. Fox, Dr. D. Long.

Laurea (BSc. Hons. + M.Sc.) in Computer Science – Department of Computer Science, University *Alma Mater Studiorum*, Bologna (Italy). Grade average: 28.6/30. MSc. in Artificial Intelligence. Date of award: March 1994. Final grade: **110/110** ***Summa cum Laude***.

Diploma di Maturità (A-Levels equivalent) – "I.T.I.S. Odone Belluzzi", Bologna (Italy). **Grade: 60/60**

CAREER HISTORY

Research Fellow	– Wolfson College, University of Cambridge (UK) (Sept 2011 –)
Investigator Scientist	– MRC Cognition & Brain Sciences Unit (Cambridge, UK); 2009 –
Postdoctoral Scientist	– MRC Cognition & Brain Sciences Unit (Cambridge, UK); 2008 – 2009
Junior Research Fellow	– Wolfson College, University of Cambridge; 2008 – 2011
MRC-Funded PhD Student	– MRC Cognition and Brain Sciences Unit, Cambridge, UK (2005 – 2008)
Visiting Scholar	– International Computer Science Institute, Berkeley, CA (Apr – Oct 2001)
Research Fellow	– Dept. of Computing, The Open University, Milton Keynes, UK (1999 – 2005)
Lab. Demonstrator	– Dept. of Computer Science, University of Durham, UK (1995 – 1998)

PEER-REVIEWED PUBLICATIONS

- **Garagnani, M.** & Pulvermüller, F. Where do intentions to act come from? A neuroanatomically grounded model of spontaneous sensorimotor circuit ignition. (*submitted*)
- **Garagnani, M**. & Pulvermüller, F. (2011d) Investigating Cognitive Representations with brain-like networks and MEG/EEG. *Clinical Neurophysiology* **122**(Suppl 1):S12, S4.4.
- **Garagnani, M.** & Pulvermüller, F. (2011a) Erratum to "From Sounds to Words: a neurocomputational model of adaptation, inhibition and memory processes in auditory change detection" [Neuroimage 54/1 (2011) 170-181] *Neuroimage*, **55**:435-436.
- **Garagnani, M.** & Pulvermüller, F. (2011b) From Sounds to Words: a neurocomputational model of adaptation, inhibition and memory processes in auditory change detection. *Neuroimage*, **54**(1):170-181.
- **Garagnani, M.,** Shtyrov, Y., & Pulvermüller, F. (2009a) Effects of attention on what is known and what is not: MEG evidence for discrete memory circuits. *Front. Hum. Neurosci.* **3**:10. doi:10.3389/neuro.09.010.2009
- **Garagnani, M.,** Wennekers, T. & Pulvermüller, F. (2009a) Recruitment and consolidation of cell assemblies for words by way of Hebbian learning and competition in a multi-layer neural network. *Cognitive Computation* **1**(2):160-176.
- **Garagnani, M.,** Wennekers, T. & Pulvermüller, F. (2008) A neuroanatomically-grounded Hebbian learning model of attention-language interactions in the human brain. *European J. of Neuroscience* **27**(2):492-513
- **Garagnani, M**., Wennekers, T. & Pulvermüller, F. (2007) A neuronal model of the language cortex. *Neurocomputing*, **70**(10-12):1914-19
- Wennekers, T., **Garagnani, M.** & Pulvermüller, F. (2006) Language models based on Hebbian cell assemblies. *Journal of Physiology – Paris*, **100**(1-3):16-30
- **Garagnani, M.** (2004) A Framework for Hybrid and Analogical Planning. In Vlahavas, I., & Vrakas, D. (eds.), *Intelligent Techniques for Planning*, **Chapter II**, Hershey (PA): IDEA Group, pp. 35-88

- **Garagnani, M.** (2004) A Diagrammatic Inter-Lingua for Planning Domain Descriptions. In Castillo, L., Borrajo, D., Salido, M. & Oddi, A. (eds.), *Frontiers in AI and Applications*, vol. **117**, Amsterdam: IOS Press, pp.129-138
- **Garagnani, M.** (2004) A Framework for Hybrid Planning. In Bramer, M., Coenen, F. & Allen, T. (eds.), *Research and Development in Intelligent Systems **XXI***, London: Springer-Verlag, pp. 214-227
- **Garagnani, M.** (2003) Model-based planning in physical domains using SetGraphs. In Coenen, F., Preece, A. & Macintosh, A. (eds.), *Research and Development in Intelligent Systems **XX***, London: Springer, pp. 295-308
- **Garagnani, M.** & Ding, Y. (2003) Model-based Planning for Object-Rearrangement Problems. In *Proc. of the 13th Int.'al Conf. Autom. Planning & Sched. - Workshop on PDDL*, Trento (Italy), June 2003, pp. 49-58
- Davidson, M. & **Garagnani, M.** (2002) Pre-processing planning domains containing Language Axioms. In *Proceedings of the 21st Workshop of the UK Planning and Scheduling SIG*, Delft (NL), Nov. 2002, pp. 23-34
- **Garagnani, M.**, Shastri, L. & Wendelken, C. (2002) A connectionist model of planning as back-chaining search. In Gray, W., Schunn, C. (eds.), *Proc. of CogSci '02*, Mahwah (NJ): Lawrence Erlbaum, pp. 345-350
- **Garagnani, M.** (2000) Extending Graphplan to Domain Axiom Planning. In *Proc. of the 19th Workshop of the UK Planning and Scheduling SIG (PlanSIG 2000)*, Milton Keynes, Dec. 2000, pp. 275-276. ISSN 1368-5708
- **Garagnani, M.** (2000) A correct algorithm for efficient planning with preprocessed domain axioms. In Bramer M., Preece A. & Coenen F. (eds.) *Research and Development in Intelligent Systems **XVII***, Springer, pp. 363-374
- **Garagnani, M.** (2000) Speaker-hearer beliefs for discourse planning. In Arabnia, H.R. (ed.), *Proc. of CSREA International Conf. on Artificial Intelligence (IC-AI 2000)*, Las Vegas (NA): CSREA Press, pp. 1009-15
- **Garagnani, M.** (1999) A Sound Linear Algorithm for Preprocessing planning problems with language axioms. In Petley, Coddington & Aylett (eds.) *Proc. of PlanSIG '99*, Manchester, Dec. 1999, pp. 40-53. ISSN 1368-5708
- **Garagnani, M.** (1998) Belief Systems and Plans for Communication. In *Proc. of the 15th International Congress on Cybernetics*, Namur (BE), Aug. 1998, pp. 373-378. ISBN 2-87215-004-8
- **Garagnani, M.** (1998) Converting Inference Rules into Conditional Effects. In McCluskey, L. & Kitchin, D. (eds.), *Proc. of PlanSIG '98*, Huddersfield (UK), pp. 203-205. ISSN 1368-5708
- **Garagnani, M.**, Fox, M. & Long, D.P. (1998) Belief Systems for Conflict Resolution. In *Proc. of 13th European Conf. on AI (ECAI-98) - Workshop on Conflicts Among Agents*, Brighton, Aug. 1998, pp. 55-60
- **Garagnani, M.** (1997) Belief Modelling for Discourse Plans. In Fox, M. (Ed.) *Proc. of PlanSIG '97*, Durham (UK), Dec. 1997, pp.55-67. ISSN 1368-5708
- Reed, C.A., Long, D.P., Fox, M. & **Garagnani, M.** (1997) Persuasion as a form of inter-agent negotiation. *Lecture Notes in Artificial Intelligence*, **1286**:120-136

PUBLISHED ABSTRACTS (* = ORAL PAPERS)

- ***Garagnani, M**. & Pulvermüller, F. (2011e) A neuroanatomically grounded model of spontaneous word generation in the human brain. *3rd Neurobiology of Language Conference* (*NLC 2011)*, Annapolis, MD, Nov 2011
- ***Garagnani, M**. & Pulvermüller, F. (2011d) Investigating Cognitive Representations with brain-like networks and MEG/EEG. *14th European Congress on Clinical Neurophysiology and 4th International Conference on Transcranial Magnetic and Direct Current Stimulation*, Rome, 21-25 June 2011.
- **Garagnani, M.** & Pulvermüller, F. (2011c) Disembodying memory: Why are memory cells typically found in prefrontal cortex? *Eighteenth Ann. Meeting of the Cognitive Neuroscience Soc.*, S. Francisco, Apr 2011, p. 160
- **Garagnani, M**. & Pulvermüller, F. (2010) Short- and Long-Term Memory contributions to Auditory Change Detection: a neurocomputational model. *Seventeenth Annual Meeting of the Cognitive Neuroscience Society*, Montréal, April 2010 – p. 123 (D23).
- ***Garagnani, M**., Shtyrov, Y., Wennekers, T. & Pulvermüller, F. (2010) Language and Attention Interactions: integrating theory with MEG/EEG experiments. *MEG UK Annual Conference*, Cardiff, 20-21 Jan. 2010
- Mohr, B., Ludlow, A., Whitmore, A., **Garagnani, M**. & Pulvermüller, F. (2010) Reduced auditory mismatch negativity to loudness discrimination in children with autism spectrum disorders. *Seventeenth Annual Meeting of the Cognitive Neuroscience Society*, Montréal, April 2010 – p. 64 (B14).
- ***Garagnani, M.**, Wennekers, T. & Pulvermüller, F. (2009b) Separating the short- and long-term memory components of the MMN response: a neurobiologically grounded computational model. *Frontiers in Human*

Neuroscience. Conference Abstract: MMN 09 Fifth Conference on Mismatch Negativity (MMN) and its Clinical and Scientific Applications. doi: 10.3389/conf.neuro.09.2009.05.041

- **Garagnani, M.,** Shtyrov, Y., & Pulvermüller, F. (2009b) Explaining Attention and Language interactions: magnetic MMN validation of neurocomputational predictions. *5th Conference on Mismatch Negativity (MMN) and its Clinical and Scientific Applications*, Budapest, Hungary, April 2009 – p.79
- Pulvermüller, F., Shebani, Z., Boulenger, V., **Garagnani, M**., Hauk, O., Sthyrov, Y. & Patterson, K. (2009) Somatotopic Motor Systems Are Critical For Category-Specific Semantic Processes. *Neurobiology of Language Conference (NLC 2009*), Chicago Oct 2009 – p. 92.
- **Garagnani, M.**, Shtyrov, Y., Wennekers, T. & Pulvermüller, F. (2008) Brain interactions of Language and Attention. *30th Annual Meeting of the Cognitive Science Society*, Washington, D.C., July 2008 – p. 2174
- ***Garagnani, M.**, Shtyrov, Y., Kujala, T., Wennekers, T. & Pulvermüller, F. (2008) Neurocomputational and neurophysiological studies of brain interactions of language and attention. *Experimental Psychology Society, Cambridge Meeting*, Cambridge, UK, April 2008 – p.52
- ***Shtyrov, Y., **Garagnani, M.**, Kujala, T., Wennekers, T. & Pulvermüller, F. (2007) Brain interactions of language and attention: MEG, EEG, fMRI and neurocomputational studies. In: *Society for Neuroscience Annual Meeting*, talk 864.4, On-line/CDROM, San Diego, CA, Nov. 2007
- **Garagnani, M.** & Pulvermüller, F. (2007) Early and late brain reflections of what makes sense: attention effects in a neuronal model of the language cortex. *14th Annual Meeting of the Cognitive Neuroscience Society*, New York, May 2007 – p. 87
- **Garagnani, M.**, Wennekers, T. & Pulvermüller, F. (2007) Explaining the effects of attention on lexical processes using a single Hebbian neuronal model of the language cortex. *39th Annual General Meeting of the European Brain & Behaviour Society*, Trieste (Italy), Sept. 2007 – p.13
- **Garagnani, M.**, Wennekers, T. & Pulvermüller, F. (2006) A neuronal model of the language cortex. *15th Annual Computational Neuroscience Meeting*, Edinburgh, July 2006 – p.6310

INVITED TALKS

- **AAAI 2011 Workshop** *Language-Action Tools for Cognitive Artificial Agents*, San Francisco, CA, August 2011 – "Sensorimotor circuits for language, memory and action: a neurocomputationally grounded model"
- **University of Barcelona & Pompeu Fabra (Spain)**, *Consolider Seminar Series*, July 2011 – Title as above
- **CNRS Research Centre on Cognitive Psychology (LPC/CNRS), Marseille**, May 2011 – Title as above
- **University of Edinburgh (UK)**, NESTCOM Workshop, Sep. 2008 – "Action-Perception Networks are Discrete: Evidence from Neuronal Network Simulations and Magnetoencephalography" (with F. Pulvermüller)
- **Anglia-Ruskin University, Department of Psychology (Cambridge, UK)**, Research Seminar Series, April 2008 – "Attentional effects in a neuronal model of the language cortex"
- **University of Salento – CRIL (Lecce, Italy)**, June 2007 **–** "Towards a mechanistic theory of language grounded in perception-action circuits of the human brain" (with F. Pulvermüller)
- **University of Stanford, Center for Study of Language and Information (CSLI), Stanford (CA)**, July 2000 – "Pre-processing Inner-Outer belief axioms for persuasive discourse planning"
- **International Computer Science Institute, Berkeley (CA),** July 2000 – Title as above
- **AI Centre, SRI International, Menlo Park (CA)**, June 2000 – Title as above
- **Department of Computer Science, University of Bologna (Italy)**, June 1999 – "Belief Modelling for Persuasive Discourse Planning"
- **Department of Computer Science, University of Pisa (Italy)**, June 1999 – Title as above.

PROFESSIONAL MEMBERSHIPS

Cambridge European Trust Scholar (Honorary); **Experimental Psychology Society**; **Cognitive Neuroscience Society; Society for the Neurobiology of Language**

OTHER ACTIVITIES

- **Peer reviewing:** *Neuroimage; Brain Research; Journal of Cog. Neuroscience; IEEE Trans. on Neural Networks; Neural Computation; Interdisc. J. of AI & Simulation of Behav.; Expert Systems; Knowledge Engin. Review*
- **Local Organizing Committee**: *Fourth Conference on Mismatch Negativity (MMN) and its Clinical & Scientific Applications*, Cambridge, April 2006
- **Editor:** *Proceedings of the 19th Workshop of the UK Planning and Scheduling SIG*, The Open University, Dec. 2000 (ISSN 1368-5708)
- **Associate Editor:** *Proc. of CSREA International Conf. on Artificial Intelligence (ICAI 2001), Vol. II*, Las Vegas, June 2001 (ISBN 1-892512-79-3)
- **Associate Editor:** *Expert Systems: Int. Journal of Knowledge Engineering and Neural Networks*, Blackwell Publishing (2001-2005)
- **Chair & Organizer**: Special Session on "Learning & Adapting in AI Planning", ICAI-01, Las Vegas, Jun. 2001
- **Conference Chair & Organizer**: *19th Workshop of the UK Planning and Sched. SIG*, The Open Uni., Dec. 2000

GRANTS & AWARDS

2008:	*Brain* Travel Grants + Gonda Brain Research Centre (Israel) + Wolfson College	(£630 + £250 + £150)
2007:	*Brain* Travel Grants + UK *Experimental Psychology Society* (EPS) Grindley Grants	(£610 + £300)
2006:	UK EPS (Grindley Grants) + Wolfson College (Travel Fund & Lane Cox Fund)	(£500 + £200)
2005:	**Medical Research Council**, **Cognition & Brain Sciences Unit –** 3-year Research Studentship	(£40K)
2005:	**Cambridge European Trust – European Student Bursary,** 3 years	(£6K)
2002:	**UK EPSRC – Fast-Stream Grant** (ref. GR/R53432/01), Principal Investigator	(£55K)
2001:	Achievement award **–** 2001 CSREA International Conference on AI (ICAI 01), Las Vegas (NA)	
1998:	**EU "Marie Curie" Research Training Grant (TMR Programme) –** 3-year PhD Studentship	(£30K)
1995:	**University of Bologna (Italy) –** Studentship for Postgraduate Full-time Studies Abroad	(£10K)
1995:	Studentship for Master Studies Abroad (sponsor: *Rolo Banca 1473*, Bologna, now *UniCredit*)	(£2K)
1994:	Best Graduates of the Year National prize (sponsor: *Rolo Banca 1473*)	(£1K)
1993:	Best Students of the Year National prize (sponsor: "*Rolo Banca 1473*")	(£1K)
1992:	Best Students of the Year National prize (sponsor: "*Rolo Banca 1473*")	(£1K)
1991:	Best Students of the Year National prize (sponsor: "*Rolo Banca 1473*")	(£1K)
1985:	Students with the Highest Grades award – "I.T.I.S. Odone Belluzzi" (Bologna, Italy)	

TEACHING

POSTGRADUATE

Guest lecturer – University of Cambridge, RCEAL "Neuroscience of Language" lecture series (Spring 2008)
WLTS seminars – MRC Cognition & Brain Sciences Unit, Cambridge (2007, 2011)
Graduate Seminars – University of Pisa & Bologna, Italy (1997-99)

UNDERGRADUATE

Guest lecturer – Anglia Ruskin University, 3rd Year Psychology "Language & Thought" module (A.Y. '07-08)
Invited lecturer – The Open University, Staff Development course, Chesham Conference Centre (Nov. 2001)
Lab. demonstrator – University of Durham, Dept. of Computer Science (A.Y.s 1997-98, 1996-97, 1995-96)

SUPERVISION & EXAMINATION

Project supervision – 3rd-year undergrad. Exp. Psychology students, University of Cambridge (A.Y. 2006-07)
Ph.D. and M.Sc. students supervision / examination – The Open University, Computing Dept. (2000-2005)

SHORT BIO

Max Garagnani attained a "*Laurea*" degree (= B.Sc. Hons. + M.Sc.) in Computer Science (*Summa cum Laude*, top 1st) from the University of Bologna (Italy) in 1994, a Ph.D. in Artificial Intelligence from the University of Durham (UK) in 1999 and a Ph.D. in Cognitive Neuroscience from the University of Cambridge (UK) in 2009. Between 1999 and 2005 he worked as independent Research Fellow at the Department of Computing of the Open University (UK), investigating symbolic models of natural language generation, knowledge representation, and reasoning about action. In 2001 he was Visiting Scholar at the International Computer Science Institute (Berkeley, CA), where, together with Dr. Lokendra Shastri, he developed one of the first neurally plausible connectionist schema exhibiting goal-oriented behaviour. During 2002-2004 he held a £55,000 Fast-Stream EPSRC grant (ref. GR/R53432/01) focussing on knowledge representation in AI planning. In 2005 he was awarded a 3-year PhD Research Studentship by the UK Medical Research Council to carry out a second PhD in Computational Cognitive Neuroscience, under the supervision of Prof. Friedemann Pulvermüller. Since 2009 he holds an Investigator Scientist post at the MRC Cognition and Brain Sciences Unit (Cambridge, UK), where he is studying the neuronal mechanisms underlying human cognition.

In his work Max exploits formal analysis expertise and knowledge of dynamic systems to design and implement symbolic and neural-network models of cognitive processes (in particular, language, attention, memory and action planning). He then applies the models to make predictions about the spatio-temporal patterns of brain activation induced by specific sensory stimuli, and experimentally tests the validity of such predictions and the generality of the models by means of non-invasive brain-imaging techniques (magnetoencephalography, MEG) and epidural recordings in humans.

Max has published 22 reviewed articles, one book chapter, a number of conference abstracts, and edited workshop and conference proceedings; from 2001 to 2005 he was associate editor of *Expert Systems*, an international journal published by Blackwell. He is a Wolfson College Research Fellow, a member of the Experimental Psychology Society, Cognitive Neuroscience Society, Society for the Neurobiology of Language, and a Cambridge European Trust Scholar Honorary member. During his career, he was awarded several studentships and prizes, including an Achievement Award in 2001, a European Marie-Curie Research Training Grant in 1996 (~£30,000), a Studentship for post-graduate Studies Abroad in 1995 (~£10,000) from the University of Bologna (Italy), one "Best Graduate of the Year" and three consecutive "Best Student of the Year" national prizes (sponsored by *Unicredit*, Italy) in 1991-94.