

# THOMAS BUHRMANN

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## PROFILE

I'm currently an Ikerbasque funded postdoc and part of the european project "Extending sensorimotor contingencies to cognition". After my PhD (on the relevance of muscle and reflex dynamics for motor control paradigms), I've worked as a developer on adaptive character simulation for NaturalMotion. My background includes artificial intelligence, artificial life, robot control, physical simulation, and cognitive science. I'm particularly interested in implications of the embodied mind theory on our understanding of animal motor coordination.

## EXPERIENCE

### POSTDOC RESEARCHER

*Ikerbasque Foundation* 2011  
Based in the University of the Basque Country and part of the european project "Extending Sensorimotor Contingencies to Cognition".

### LEAD BEHAVIOUR ENGINEER

*NaturalMotion, Oxford, UK* 2009-2011  
Development of next-generation physical and adaptive character simulation technology: [www.naturalmotion.com/euphoria](http://www.naturalmotion.com/euphoria).

### BEHAVIOUR ENGINEER

*NaturalMotion, Oxford, UK* 2007-2009  
Development of procedural, physically simulated characters and adaptive behaviours. Shipped as "euphoria" middleware solution in AAA game titles such as Rockstar's Max Payne, Red Dead Redemption; LucasArts' Star Wars: The Force Unleashed; and NaturalMotion's Backbreaker

### TEACHING ASSISTANT AND WEBMASTER

*University of Sussex* 2003-2006  
Teaching of courses such as Adaptive Systems, Animal and Machine Intelligence, Formal Computational Skills and Non-Symbolic AI. Created and administrated website for the CCNR lab.

### RESEARCH ASSISTANT

*Fraunhofer Institute for Media Communication* 2001-2002  
Creation and execution of virtual reality based psychophysical experiments.

## EDUCATION

### D.PHIL. IN COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE

*University of Sussex, UK* 2003-2007  
Thesis: "On the intrinsic control properties of muscles and reflexes: exploring the interaction between neural and musculoskeletal dynamics in the framework of the equilibrium-point hypothesis"

### M.SC. WITH DISTINCTION IN EVOLUTIONARY AND ADAPTIVE SYSTEMS

*University of Sussex, UK* 2002-2003  
Thesis: "Model-free robot control: incremental evolution of dynamic neuro-controllers for visually-guided movements"

### RESEARCH ASSISTANT

*Ruhr-Universität Bochum, Germany* 2001-2002  
Collaboration with Fraunhofer Institute on psychophysical experiments using Virtual Reality technology under supervision of Prof. Dr. Markus Lappe. Work on a commercial graph-based face recognition software led by Prof. Dr. Christoph von der Malsburg and in collaboration with the University of Southern California.

### SEMESTER ABROAD

*University of Ulster* 2000-2001  
Research project applying swarm intelligence algorithms to telecommunication networks in commercial collaboration with Nortel.

B.SC. IN COGNITIVE SCIENCE  
Universität Osnabrück

1998-2001

AWARDS / HONORS

THREE YEAR TEACHING ASSISTANTSHIP: GRANT AND EMPLOYMENT  
*Awarded by: School of Science and Technology, University of Sussex, UK* 2003

SCHOLARSHIP FOR MSC IN EVOLUTIONARY AND ADAPTIVE SYSTEMS  
*Awarded by: EPSRC, UK* 2002

SCHOLARSHIP FOR SEMESTER ABROAD IN BELFAST, UK  
*Awarded by: German Academic Exchange Service (DAAD)* 2000

PUBLICATIONS

Eduardo J. Izquierdo , Thomas Buhrmann (2008). *Analysis of a Dynamical Recurrent Neural Network Evolved for Two Qualitively Different Tasks: Walking and Chemotaxis*. In Bullock, S., Noble, J., Watson, R. A. and Bedau, M. A. , editors, Proceedings of the Eleventh International Conference on the Simulation and Synthesis of Living Systems, pages 257-264. MIT Press. 2008.

Lappe, M.; Frenz, H.; Bührmann, T.; Kolesnik, M. (2007). *Estimation of travel distance from visual motion in virtual environments*. ACM Transactions on Applied Perception (TAP), Volume 4 Issue 1, January, ACM New York, NY, USA, 2007.

Buehrmann, T., and Di Paolo, E. A., (2006). *Biological actuators are not just springs: Investigating muscle dynamics and control signals*. From Animats to Animals 9 The Ninth International Conference on the Simulation of Adaptive Behavior (SAB'06) 25 – 29 September 2006, CNR, Roma, Italy , S. Nolfi et al. (eds), Springer, Berlin Heidelberg, LNAI 4095, pp 89-100.

Lappe, M.; Frenz, H.; Bührmann, T.; Kolesnik, M. (2005). *Virtual odometry from visual flow*. Proc. SPIE 5666, 493 (2005). Proceedings from the Conference on Human Vision and Electronic Imaging, San Jose, California, USA. Bellingham/Wash, 2005.

Thomas Buehrmann, Ezequiel Di Paolo (2004). *Closing the loop: Evolving a model-free visually guided robot arm*. Artificial life IX Proceedings of the Ninth International Conference on the Simulation and Synthesis of Artificial Life. MIT Press, 2004.

CONFERENCES

THE FUTURE OF THE EMBODIED MIND (CO-ORGANIZER)  
*eSMCs Summer School, San Sebastian, Spain* Sep 2011

FROM ANIMALS TO ANIMATS 9, SAB '06 (TALK)  
*International Conference on Simulation of Adaptive Behavior, Rome, Italy* Sep 2006

NEUROENGINEERING OF COGNITIVE FUNCTIONS  
*3rd European Neuro-IT and Neuroengineering School, Venice, Italy* Jun 2005

THE DYNAMICAL SYSTEMS APPROACH TO LIFE AND COGNITION  
*Workshop, University of Sussex* Mar 2005

ALIFE IX, BOSTON (TALK)  
*International Conference on the Simulation and Synthesis of Living Systems* Sep 2004

FIFTH GERMAN WORKSHOP ON ARTIFICIAL LIFE  
*Abstracting and synthesizing the principles of living systems, Lübeck.* Mar 2002

LANGUAGES

German (Native)  
English (Fluent)  
Spanish (Elementary)

SKILLS

C++, C, Java, Matlab, Mathematica, Physical simulation and modeling, Genetic Algorithms, Neural Networks, Scientific visualization, Dynamical Systems, Web development