Daan Bloembergen

Curriculum Vitæ

Personal information

Full name	Daniël (Daan) Bloembergen
Nationality	Dutch
Date of birth	upon request
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About me

Currently I am a researcher at the Intelligent and Autonomous Systems group at Centrum Wiskunde & Informatica (CWI, the national research institute for mathematics and computer science) in Amsterdam, The Netherlands.

My research focus is on multi-agent learning, especially reinforcement learning. I am interested in investigating how multiple learning agents interact and influence each other, what kind of global system dynamics arise, and how desired behaviour can be obtained by modifying the learning algorithms used. The settings I look at range from one-on-one interactions (e.g. games) to small groups (e.g. multi-agent coordination) and large communities (e.g. interactions in social networks).

Previously I held a position as Postdoctoral Research Associate at the Department of Computer Science, University of Liverpool, UK. I did my PhD research at Maastricht University, where I graduated in May 2015.

Relevant work experience

Oct 2017–present **Researcher**, *Centrum Wiskunde & Informatica*, Intelligent and Autonomous Systems.

Working on multi-agent systems, in particular multi-agent learning and coordination in the context of smart energy systems (ERA-Net Smart Grids Plus, project Grid-Friends, led by Dr. Michael Kaisers). Assisting in the daily supervision of research interns and M.Sc. thesis project students.

Mar 2015–Sep 2017 **Postdoctoral Research Associate**, *University of Liverpool*, Dept. of Computer Science.

Postdoc on multi-agent learning under supervision of Prof. dr. Karl Tuyls. Research focussing on the dynamics of multi-agent learning, in particular the link between evolutionary game theory and reinforcement learning. Assisting Prof. Tuyls in the daily supervision of three Ph.D. students on the following topics: 1) game theoretic modelling of space debris removal; 2) modelling mood in multi-agent interactions; 3) multi-agent deep reinforcement learning.

Mar 2014–Mar 2014 **Honorary Research Assistant**, *University of Liverpool*, Dept. of Computer Science.

Visiting PhD student at the Agent ART group, under supervision of Prof. dr. Karl Tuyls.

Nov 2010–Mar 2015 **Ph.D. researcher**, *Maastricht University*, Dept. of Knowledge Engineering.

See below.

Education

Nov 2010–May 2015) **Ph.D. in Computer Science / Artificial Intelligence**, *Maastricht University*.

Research project focusing on the link between evolutionary game theory (EGT) and multi-agent reinforcement learning, in particular the use of EGT to model the learning dynamics of a multi-agent system. The project was funded by the Netherlands Organisation for Scientific Research (NWO).
Supervisors: Prof. dr. Karl Tuyls, Prof. dr. Gerhard Weiss
Title of the dissertation: Multi-Agent Learning Dynamics
Successfully defended on: 21 May 2015

2008–2010 **M.Sc. Artificial Intelligence**, *Maastricht University*.

Predicate Cum Laude (weighted percentage 86.3%)

2007–2008 **M.A. European Studies on Society, Science, and Technology**, *Maastricht University*, *unfinished, 38 ECTS earned*.

Including a 4 month specialisation in *Research and Technology Policy* at the University of Oslo, Norway

2004–2007 **B.Sc. Knowledge Engineering**, *Maastricht University*.

Activities

Teaching

Module co-ordinator and lecturer, *COMP532: Machine Learning and BioInspired Optimisation*, Covered topics: reinforcement learning, multi-agent learning, swarm intelligence, deep learning, artificial immune systems, DNA computing.

Postgraduate module, Department of Computer Science, University of Liverpool, 2016/17

Teaching Assistant, *Computer Science*, introduction to JAVA programming.

B.Sc. Knowledge Engineering, Maastricht University. 2013/14, 2012/13, 2011/12

Teaching Assistant, *Theoretical Computer Science*, introduction to automata, formal languages, computability, and complexity.

B.Sc. Knowledge Engineering, Maastricht University. 2013/12, 2011/12

Invited talks and lectures

Guest Lecturer, *Lecture on Multi-Agent Learning*, MSc module on Planning en Reinforcement Learning, VU Amsterdam, April 2019.

Lecturer, *Multi-Agent Reinforcement Learning and Dynamics of Learning*, European Agent Systems Summer School (EASSS), Maastricht, June 2018.

Lecturer, *Multi-Agent Reinforcement Learning and Dynamics of Learning*, European Agent Systems Summer School (EASSS), Gdansk, August 2017.

Lecturer and co-organiser, *Tutorial on Reinforcement Learning in Single and Multi-Agent Settings*, International Conference on Autonomous Agents and Multi-agent Systems (AAMAS) 2016, Singapore.

Lecturer, *Tutorial on Multi-agent Reinforcement Learning*, Adaptive and Learning Agents workshop at AAMAS 2014, Paris, France.

Lecturer, *Multi-agent Reinforcement Learning tutorial*, European Conference on Machine Learning (ECML) 2013, Prague, Czech Republic.

Lecturer, *Multi-agent Reinforcement Learning tutorial*, AAMAS 2013, St. Paul, USA.

Academic activities

Co-chair, *8th Adaptive and Learning Agents Workshop (ALA) at AAMAS 2016*, Singapore.

Co-chair, *7th Adaptive and Learning Agents Workshop (ALA) at AAMAS 2015*, Istanbul, Turkey.

Local organisation member, *9th European Workshop on Multi-agent Systems (EUMAS 2011)*, Maastricht, The Netherlands.

Program Committee member, *AAAI 2016, AAMAS 2016–2019, IJCAI 2015–2019, TAROS 2015, ALA 2013/14*.

Reviewer, *Journal of Autonomous Agents and Multi-Agent Systems; IEEE Transactions on Cybernetics; Games – Open Access Game Theory Journal*.

Other

Sept 2013–Aug 2014 **Chair**, *PhD Academy Maastricht*, organises social, educative and fun activities for all PhD candidates of Maastricht University.

Jan 2012–Aug 2013 **Social events coordinator**, *PhD Academy Maastricht*.

2008–2009 **Chair**, *Study Association Incognito*, organises social and academic activities for all bachelor and master students at the Department of Knowledge Engineering, Maastricht University.

2006–2007 **Activities Committee member**, *Study Association Incognito*.

Awards

2014 **FoCAS best paper award**, at the Adaptive and Learning Agents workshop (ALA) at AAMAS 2014 for the paper titled "Trading in markets with noisy information: An evolutionary analysis".
`http://focas.eu/best-paper-award-ala-2014`

2011 **KION Thesis award 2008-2010**, Award for the best master's thesis in Artifical Intelligence in the Netherlands.
`http://www.kion.nu`

Languages

Dutch	**Fluent**	*Mother tongue*
English	**Fluent**	*Main language of instruction throughout higher education*
German	**Moderate**	*Good understanding of spoken and written German, moderate writing and speaking skills*

Programming experience

Software	MATLAB, ROS (Robot Operating System), LaTeX
Programming languages	Java, Python, C++

Selected publications

2019 Bakker, Jasper, Aron Hammond, **Daan Bloembergen**, and Tim Baarslag (2019). "RLBOA: A Modular Reinforcement Learning Framework for Autonomous Negotiating Agents". In: *Proc. of 18th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 260–268.

Bloembergen, **Daan**, Davide Grossi, and Martin Lackner (2019). "On Rational Delegations in Liquid Democracy". In: *AAAI Conference on Artificial Intelligence*.

Klima, Richard, **Daan Bloembergen**, Michael Kaisers, and Karl Tuyls (2019). "Robust temporal difference learning for critical domains". In: *Proc. of the 18th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 350–358.

Santos, Fernando P. and **Daan Bloembergen** (2019). "Fairness in Multiplayer Ultimatum Games Through Moderate Responder Selection". In: *Proceedings of the 2019 Conference on Artificial Life*, pp. 187–194.

2018 Klima, Richard, **Daan Bloembergen**, Rahul Savani, Karl Tuyls, Alexander Wittig, Andrei Sapera, and Dario Izzo (2018). "Space Debris Removal: Learning to Cooperate and the Price of Anarchy". In: *Frontiers in Robotics and AI* 5, p. 54.

Palmer, Gregory, Karl Tuyls, **Daan Bloembergen**, and Rahul Savani (2018). "Lenient Multi-Agent Deep Reinforcement Learning". In: *Proc. of the 17th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 443–451.

2017 **Bloembergen**, **Daan**, Tim Brys, and Logan Yliniemi (2017). "Preface to the special issue: adaptive and learning agents". In: *The Knowledge Engineering Review* 32.

2016 Klima, Richard, **Daan Bloembergen**, Rahul Savani, Karl Tuyls, Daniel Hennes, and Dario Izzo (2016). "Space Debris Removal: A Game Theoretic Analysis". In: *Games* 7.3, p. 20.

Tuyls, Karl, Sjriek Alers, Elisa Cucco, Daniel Claes, and **Daan Bloembergen** (2016). "A Telepresence-Robot Approach for Efficient Coordination of Swarms". In: *Proceedings of the Artificial Life Conference 2016*, pp. 666–673.

2015 **Bloembergen**, **Daan**, Ipek Caliskanelli, and Karl Tuyls (2015). "Learning in Networked Interactions: A Replicator Dynamics Approach". In: *Artificial Life and Intelligent Agents*. Vol. 519. Communications in Computer and Information Science, pp. 44–58.

Bloembergen, **Daan**, Daniel Hennes, Peter McBurney, and Karl Tuyls (2015). "Trading in markets with noisy information: An evolutionary analysis". In: *Connection Science* 27, pp. 253–268.

Bloembergen, **Daan**, Daniel Hennes, Simon Parsons, and Karl Tuyls (2015). "Survival of the chartist: An evolutionary agent-based analysis of stock market trading". In: *Proc. of the 14th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 1699–1700.

Bloembergen, **Daan**, Karl Tuyls, Daniel Hennes, and Michael Kaisers (2015). "Evolutionary Dynamics of Multi-Agent Learning: A Survey". In: *Journal of Artificial Intelligence Research* 53, pp. 659–697.

2014 **Bloembergen**, **Daan**, Bijan Ranjbar-Sahraei, Haitham Bou Ammar, Karl Tuyls, and Gerhard Weiss (2014). "Influencing Social Networks: An Optimal Control Study". In: *Proc. of the 21st Europ. Conf. on Artificial Intelligence (ECAI)*, pp. 105–110.

Ranjbar-Sahraei, Bijan, **Daan Bloembergen**, Haitham Bou Ammar, Karl Tuyls, and Gerhard Weiss (2014). "Effects of Evolution on the Emergence of Scale Free Networks". In: *Proc. of the 14th Int. Conf. on the Synthesis and Simulation of Living Systems (ALIFE)*, pp. 376–383.

Ranjbar-Sahraei, Bijan, Haitham Bou Ammar, **Daan Bloembergen**, Karl Tuyls, and Gerhard Weiss (2014a). "Evolution of Cooperation in Arbitrary Complex Networks". In: *Proc. of 13th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 677–684.

Ranjbar-Sahraei, Bijan, Haitham Bou Ammar, **Daan Bloembergen**, Karl Tuyls, and Gerhard Weiss (2014b). "Theory of Cooperation in Complex Social Networks". In: *Proc. of the 25th AAAI Conf. on Artificial Intelligence (AAAI)*, pp. 1471–1477.

2013 Alers, Sjriek, **Daan Bloembergen**, Daniel Claes, Joscha Fossel, Daniel Hennes, and Karl Tuyls (2013). "Telepresence Robots as a Research Platform for AI". In: *Proc. of the AAAI Spring Symp. on Designing Intelligent Robots: Reintegrating AI II*, pp. 2–3.

2012 Hennes, Daniel, **Daan Bloembergen**, Michael Kaisers, Karl Tuyls, and Simon Parsons (2012). "Evolutionary advantage of foresight in markets". In: *Proc. of the Genetic and Evolutionary Computation Conference (GECCO)*, pp. 943–950.

Kaisers, Michael, **Daan Bloembergen**, and Karl Tuyls (2012). "A Common Gradient in Multi-agent Reinforcement Learning". In: *Proc. of 11th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 1393–1394.

2011 **Bloembergen**, **Daan**, Steven De Jong, and Karl Tuyls (2011). "Lenient Learning in a Multiplayer Stag Hunt". In: *Proc. of 23rd Benelux Conf. on Artificial Intelligence (BNAIC)*, pp. 44–50.

Bloembergen, **Daan**, Michael Kaisers, and Karl Tuyls (2011). "Empirical and Theoretical Support for Lenient Learning". In: *Proc. of 10th Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 1105–1106.

2010 **Bloembergen**, **Daan**, Michael Kaisers, and Karl Tuyls (2010a). "A comparative study of multi-agent reinforcement learning dynamics". In: *Proc. of 22nd Benelux Conf. on Artificial Intelligence (BNAIC)*, pp. 11–18.

Bloembergen, **Daan**, Michael Kaisers, and Karl Tuyls (2010b). "Lenient frequency adjusted Q-learning". In: *Proc. of 22nd Benelux Conf. on Artificial Intelligence (BNAIC)*, pp. 19–26.