

# ir. Tim Brys

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CONTACT INFORMATION Artificial Intelligence Lab timbrys@vub.ac.be  
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Pleinlaan 2 Last updated on June 16, 2015  
1050 Brussels, Belgium

EDUCATION **PhD in Computer Science, Vrije Universiteit Brussel** **2011 - present**

Title: Reinforcement Learning on Multiple Correlated Signals  
Supervisors: Prof. Ann Nowé

- If a learning agent has multiple sources of information that essentially describe the same problem, it can try to strategically combine the information from these sources in order to learn faster and find better solutions. Such problems can occur naturally, as in the case of traffic optimization, where the delay of cars and throughput of the system are strongly correlated objectives. But we can also construct such problems, by fabricating multiple versions of the same reward signal using different pieces of knowledge, derived from various sources.

**MSc in Engineering: Computer Science, Vrije Universiteit Brussel** **2008 - 2011**

Thesis: Local Coordination and Adaptive Strategies in Robot Soccer  
Supervisor: Prof. Ann Nowé  
2008 - 2009 was a bridging year necessary for MSc (schakeljaar)  
2008 - 2010 part-time paid software development at XaoP

Grade: Summa cum laude

**BSc in Applied Computer Science, Erasmus Hogeschool Brussel** **2005 - 2008**

Thesis: Racesimulation with Artificial Intelligence  
Supervisor: Philippe Van Laethem  
3 months software development internship at XaoP

Grade: Magna cum laude

HONORS AND AWARDS

<b>FoCAS</b>	Best Paper ALA at AAMAS-15	<b>2015</b>
<b>RLDM</b>	Student Travel Fellowship	<b>2015</b>
<b>FWO</b>	Travel Grant for a short stay abroad (one month)	<b>2014</b>
<b>AAAI</b>	Doctoral Consortium Scholarship	<b>2014</b>
<b>ACM</b>	Best Paper GECCO-13 IGEC/ESEP/BIO Track	<b>2013</b>
<b>IEEE</b>	Best Paper Nomination IEEE SSCI-13	<b>2013</b>
<b>FWO</b>	Travel Grant for a short stay abroad (one month)	<b>2012</b>
<b>IEEE</b>	Best Student Paper NAFIPS-12	<b>2012</b>
<b>AAAI</b>	Student Travel Scholarship	<b>2012</b>
<b>FWO</b>	PhD. Fellowship	<b>2012 - 2016</b>
<b>VUB</b>	Bridging Scholarship	<b>2011 - 2012</b>

TEACHING **Courses at Vrije Universiteit Brussel**

Practical sessions, projects and/or exams for the following courses:

- Machine Learning (BSc) **2011 - 2015**
- Computational Game Theory (MSc) **2012 - 2013**
- Multi-agent Learning Seminar (MSc) **2011 - 2015**

## Thesis Students Advised

- Steven Adriaensen (MSc) **2012 - 2013**

## Workshops for high school students

- 7x Half-day introduction to AI and robotics by programming soccer robots **2011 - 2013**

## RESEARCH VISITS

**Prof. Matthew E. Taylor** **2012 & 2014**  
Washington State University, Pullman, WA 1 month  
Lafayette College, Easton, PA 1 month

**Prof. Daniel Kudenko** **2014**  
University of York, York, UK 1 week

**Dr. Peter A.N. Bosman** **2012 & 2013**  
CWI, Amsterdam, NL 2 x 1 week

## SCIENTIFIC ACTIVITIES

- Participant IJCAI Doctoral Consortium **2015**
- Lecturer at the Agents Teaching Agents Tutorial at AAMAS **2015**
- PC member IJCAI-15 **2015**
- PC member ALA-15 **2015**
- Departmental Seminar Washington State University **2014**
- Participant AAAI Doctoral Consortium **2014**
- Departmental Seminar University York **2014**
- Session chair at the 6th Adaptive Learning Agents Workshop at AAMAS **2014**
- Lecturer at the Multi-agent Reinforcement Learning (MARL) Tutorial at AAMAS **2013**
- Session chair at the 5th Adaptive Learning Agents Workshop at AAMAS **2013**
- Presenter at the Multi-agent Reinforcement Learning (MARL) Tutorial at AAMAS **2012**

## REVIEWER

- Journal of Autonomous Agents and Multi-Agent Systems **2013, 2015**
- International Joint Conference on Artificial Intelligence **2015**
- German Journal on Artificial Intelligence **2014**
- IEEE Symposium Series on Computational Intelligence **2013, 2014**
- Journal of Intelligent Transportation Systems **2013**
- Advances in Fuzzy Systems **2013**
- International Journal on Computational Intelligence Systems **2013**
- World Congress on Nature and Biologically Inspired Computing **2013**

## LANGUAGES

- Dutch: mothertongue
- French & English: fluent reading, speaking & writing
- German & Spanish: basic knowledge

## PUBLICATIONS

### Book Chapters

- [1] **Tim Brys**, Yann-Michaël De Hauwere, Ann Nowé and Peter Vrancx (2012). Local coordination in online distributed constraint optimization problems. *Multi-Agent Systems*, Selected and Revised Papers of EUMAS-11, LNAI, Volume 7541, pages 31-47. Springer Berlin / Heidelberg. ISBN 978-3-642-34799-3.

### Journal Articles

- [2] **Tim Brys**, Tong T. Pham and Matthew E. Taylor (2014). Distributed learning and multi-objectivity in traffic light control. *Connection Science*, 26(1), pages 65-83. Taylor & Francis.

### Conference Papers

- [3] **Tim Brys**, Anna Harutyunyan, Halit Bener Suay, Sonia Chernova, Matthew E. Taylor and Ann Nowé (2015). Reinforcement Learning from Demonstration through Shaping. In Proceedings of the International Joint Conference on Artificial Intelligence (*IJCAI*).
- [4] **Tim Brys**, Anna Harutyunyan, Matthew E. Taylor and Ann Nowé (2015). Policy Transfer using Reward Shaping. In Proceedings of the International Conference on Autonomous Agents and Multi-Agent Systems (*AAMAS*), pages 181-188.
- [5] Kristof Van Moffaert, **Tim Brys** and Ann Nowé (2015). Risk-Sensitivity Through Multi-Objective Reinforcement Learning. In Proceedings of the IEEE Congress on Evolutionary Computation (*IEEE CEC*).
- [6] Silvio Rodrigues, **Tim Brys**, Rodrigo Teixeira Pinto, Ann Nowé and Pavol Bauer (2015). Online Distributed Voltage Control of an Offshore MTdc Network using Reinforcement Learning. In Proceedings of the IEEE Congress on Evolutionary Computation (*IEEE CEC*).
- [7] Ivomar Brito Soares, Yann-Michaël De Hauwere, Kris Januarius, **Tim Brys**, Thierry Salvant and Ann Nowé (2015). Departure MANagement with a Reinforcement Learning Approach: Respecting CFMU Slots. In Proceedings of the IEEE International Conference on Intelligent Transportation Systems (*ITSC*).
- [8] **Tim Brys**, Ann Nowé, Daniel Kudenko and Matthew E. Taylor (2014). Combining Multiple Correlated Reward and Shaping Signals by Measuring Confidence. In Proceedings of the Twenty-Eighth AAAI Conference on Artificial Intelligence (*AAAI*), pages 1687-1693.
- [9] Steven Adriaensen, **Tim Brys** and Ann Nowé (2014). Fair-Share ILS: A Simple State-of-the-art Iterated Local Search Hyperheuristic. In Proceedings of the Genetic and Evolutionary Computation Conference (*GECCO*), pages 1303-1310.
- [10] Steven Adriaensen, **Tim Brys** and Ann Nowé (2014). Designing Reusable Metaheuristic Methods: A Semi-automated Approach. In Proceedings of the IEEE Congress on Evolutionary Computation (*IEEE CEC*), pages 2969-2976.
- [11] **Tim Brys**, Anna Harutyunyan, Peter Vrancx, Matthew E. Taylor, Daniel Kudenko and Ann Nowé (2014). Multi-Objectivization of Reinforcement Learning Problems by Reward Shaping. In Proceedings of the International Joint Conference on Neural Networks (*IJCNN*), pages 2315-2322.
- [12] Kristof Van Moffaert, **Tim Brys**, Arjun Chandra, Lukas Esterle, Peter Lewis and Ann Nowé (2014). A Novel Adaptive Weight Selection Algorithm for Multi-Objective Multi-Agent Reinforcement Learning. In Proceedings of the International Joint Conference on Neural Networks (*IJCNN*), pages 2306-2314.
- [13] **Tim Brys**, Kristof Van Moffaert, Kevin Van Vaerenbergh and Ann Nowé (2013). On the behaviour of scalarization methods for the engagement of a wet clutch. In Proceedings of the 12th International Conference on Machine Learning and Applications (*ICMLA*), pages 258-263.
- [14] **Tim Brys**, Madalina M. Drugan and Ann Nowé (2013). Meta-evolutionary algorithms and recombination operators for satisfiability solving in fuzzy logics. In Proceedings of the IEEE Congress on Evolutionary Computation (*IEEE CEC*), pages 1060-1067.

- [15] **Tim Brys**, Madalina M. Drugan, Peter A.N. Bosman, Martine De Cock and Ann Nowé (2013). Solving satisfiability in fuzzy logics by mixing CMA-ES. In Proceedings of the Genetic and Evolutionary Computation Conference (*GECCO*), pages 1125-1132. **Best Paper Award** in IGEC/ESEP/BIO Track.
- [16] **Tim Brys**, Madalina M. Drugan, Peter A.N. Bosman, Martine De Cock and Ann Nowé (2013). Local search and restart strategies for satisfiability solving in fuzzy logics. In Proceedings of the IEEE Symposium Series on Computational Intelligence (*IEEE SSCI*), pages 52-59. **Nominated for Best Paper Award**.
- [17] **Tim Brys**, Yann-Michaël De Hauwere, Martine De Cock and Ann Nowé (2012). Solving satisfiability in fuzzy logics with evolution strategies. In Proceedings of the 31st Annual North American Fuzzy Information Processing Society Meeting (*NAFIPS*), pages 1-6. **Best Student Paper Award**.

### Short Conference Papers

- [18] **Tim Brys** (2015). Encoding and Combining Knowledge to Speed up Reinforcement Learning. In Proceedings of the International Joint Conference on Artificial Intelligence (*IJCAI*).
- [19] **Tim Brys**, Anna Harutyunyan, Matthew E. Taylor and Ann Nowé (2015). Ensembles of Shapings. In Proceedings of the Second Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM).
- [20] Halit B. Suay, **Tim Brys**, Matthew E. Taylor and Sonia Chernova (2015). Reward Shaping by Demonstration. In Proceedings of the Second Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM).
- [21] Anna Harutyunyan, **Tim Brys**, Peter Vrancx and Ann Nowé (2015). Shaping Mario with Human Advice (Demonstration). In Proceedings of the 14th International Conference on Autonomous Agents and Multi-Agent Systems (*AAMAS*), pages 1913-1914.
- [22] Anna Harutyunyan, **Tim Brys**, Peter Vrancx and Ann Nowé (2015). Multi-Scale Reward Shaping via an Off-Policy Ensemble. In Proceedings of the 14th International Conference on Autonomous Agents and Multi-Agent Systems (*AAMAS*), pages 1641-1642.
- [23] Steven Adriaensen, **Tim Brys** and Ann Nowé (2014). Fair-Share ILS: A Simple State-of-the-art Iterated Local Search Hyperheuristic. In Proceedings of the 26th Benelux Conference on Artificial Intelligence (*BNAIC*). Type B paper (previously published results).
- [24] **Tim Brys**, Ann Nowé, Daniel Kudenko and Matthew E. Taylor (2014). Combining Multiple Correlated Reward and Shaping Signals by Measuring Confidence. In Proceedings of the 26th Benelux Conference on Artificial Intelligence (*BNAIC*). Type B paper (previously published results).
- [25] **Tim Brys**, Matthew E. Taylor and Ann Nowé (2014). Using Ensemble Techniques and Multi-Objectivization to Solve Reinforcement Learning Problems. In Proceedings of the Twenty-First European Conference on Artificial Intelligence (*ECAI*), pages 981-982.
- [26] Anna Harutyunyan, **Tim Brys**, Peter Vrancx and Ann Nowé (2014). Off-Policy Shaping Ensembles in Reinforcement Learning. In Proceedings of the Twenty-First European Conference on Artificial Intelligence (*ECAI*), pages 1021-1022.

- [27] **Tim Brys** and Ann Nowé (2014). Reinforcement Learning on Multiple Correlated Signals. In Proceedings of the Twenty-Sixth AAAI Conference on Artificial Intelligence (*AAAI*), pages 3065-3066.
- [28] **Tim Brys**, Kristof Van Moffaert, Ann Nowé and Matthew E. Taylor (2014). Adaptive Objective Selection for Correlated Objectives in Multi-Objective Reinforcement Learning. In Proceedings of the 13th International Conference on Autonomous Agents and Multi-Agent Systems (*AAMAS*), pages 1349-1350.
- [29] **Tim Brys**, Madalina M. Drugan, Peter A.N. Bosman, Martine De Cock and Ann Nowé (2013). Solving satisfiability in fuzzy logics by mixing CMA-ES. In Proceedings of the 25th Benelux Conference on Artificial Intelligence (*BNAIC*). Type B paper (previously published results).
- [30] **Tim Brys**, Yann-Michaël De Hauwere, Martine De Cock and Ann Nowé (2012). Solving satisfiability in fuzzy logics with evolution strategies. In Proceedings of the 24th Benelux Conference on Artificial Intelligence (*BNAIC*). Type B paper (previously published results).
- [31] **Tim Brys** and Ann Nowé (2012). Improving convergence of CMA-ES through structure-driven discrete recombination. In Proceedings of the Twenty-Sixth AAAI Conference on Artificial Intelligence (*AAAI*), pages 2415-2416.

#### Refereed Workshop and Symposium Papers

- [32] William Curran, **Tim Brys**, Matthew E. Taylor and William Smart (2015). Using PCA to Efficiently Represent State Spaces. In Proceedings of the European Workshop on Reinforcement Learning (*EWRL*) at ICML 2015.
- [33] Anna Harutyunyan, **Tim Brys**, Peter Vrancx and Ann Nowé (2015). Off-Policy Reward Shaping with Ensembles. In Proceedings of the Adaptive Learning Agents Workshop (*ALA*) at AAMAS 2015. **Best Paper Award**.
- [34] Tong T. Pham, **Tim Brys** and Matthew E. Taylor (2013). Learning coordinated traffic light control. In Proceedings of the Adaptive Learning Agents Workshop (*ALA*) at AAMAS 2013.
- [35] **Tim Brys**, Yann-Michaël De Hauwere, Ann Nowé and Peter Vrancx (2011). Local coordination in online distributed constraint optimization problems. In Proceedings of the 9th European Workshop on Multi-Agent Systems (*EUMAS*).

#### Technical Reports

- [36] Anna Harutyunyan, **Tim Brys**, Peter Vrancx and Ann Nowé (2014). Off-Policy Shaping Ensembles in Reinforcement Learning. Technical Report, arXiv:1405.5358.
- [37] Kristof Van Moffaert, **Tim Brys** and Ann Nowé (2014). Efficient Weight Space Search in Multi-Objective Reinforcement Learning. Technical Report *AI-TR-14-69*, AI Lab, Vrije Universiteit Brussel, Brussels, Belgium.
- [38] **Tim Brys**, Anna Harutyunyan, Peter Vrancx, Matthew E. Taylor, Daniel Kudenko and Ann Nowé (2013). Multi-Objectivization in Reinforcement Learning. Technical Report *AI-TR-13-354*, AI Lab, Vrije Universiteit Brussel, Brussels, Belgium.