Carlos G. Diuk-Wasser

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http://carlosdiuk.github.io

Current Position

2013-present Facebook, Inc. Data Scientist in Core Data Science Team.

Education

2010 PhD in Computer Science, Rutgers University-New Brunswick. Dissertation: "An Object-oriented Representation for Efficient Reinforcement Learning". Advisor: Michael Littman.

2003 Licenciatura in Computer Science (6-year degree), University of Buenos Aires. Thesis: "A Computational Tool for the Reconstruction of Genealogies".

Professional and Research Experience

2009-2013	Princeton University. Research Scientist (2013) and Postdoctoral Research Associate (2009-2012). Yael Niv and Matthew Botvinick laboratories. Department of Psychology and Neuroscience Institute.
2007	Google (NY). Graduate Summer Intern in the Personalized Search group.
2006	Intel Research. Graduate Research Intern in the Distributed Detection and Inference group.
2004	Yale University. Developer of web infrastructure for research projects in the Dept. of Public Health.
1998-03	University of Buenos Aires. Research Assistant for Enrique Tándeter, developing algorithms for genealogy reconstruction from historical records.
2003	Project Manager at Tecnonexo (USA office).
2000-03	Independent consultant for more than 10 major companies in Argentina
1998-00	Project Leader at Lemma Informatics for Movicom/Bellsouth Argentina and the Public Libraries of the City of Buenos Aires.

PUBLICATIONS

Available pre-prints

- Carlos Diuk, Natalia Córdova, Yael Niv and Matthew Botvinick
  Discovering hierarchical task structure. *In preparation.*

Journals and Peer-reviewed Proceedings

- Alec Solway, Carlos Diuk, Natalia Córdoba, Debbie Yee, Andrew G. Barto, Yael Niv and Matthew Botvinick
  Optimal Behavioral Hierarchy. *PLOS Computational Biology, 2014*

- Luciano Paz, Andrea Goldin, Carlos Diuk and Mariano Sigman
  Parsing heuristic and forward search in first-graders game-play behavior. *Cognitive Science. 2014*

- Carlos Diuk, Karin Tsai, Jonathan Wallis, Matthew Botvinick and Yael Niv (2013)
  Hierarchical learning induces two simultaneous, but separable, prediction errors in human basal ganglia. *The Journal of Neuroscience, 33 (13), 5797-5805.*

- Carlos Diuk, Anna Schapiro, Natalia Córdova, Yael Niv and Matthew Botvinick (in press). **Divide and conquer: hierarchical reinforcement learning and task decomposition in humans.** *In "Computational and Robotic Models of the Hierarchical Organization of Behavior" book.* Baldassare G, Mirolli M (Eds.). Springer Verlag.

- Carlos Diuk, Diego F. Slezak, Iván Raskovsky, Mariano Sigman and Guillermo Cecchi (2012). **A quantitative philology of introspection.** *Frontiers of Integrative Neuroscience, 6 (80), 1-12.*

- José J.F. Ribas-Fernandes, Alec Solway, Carlos Diuk, Joseph T. McGuire, Andrew G. Barto, Yael Niv and Matthew M. Botvinick (2011). **A Neural Signature of Hierarchical Reinforcement Learning.** *Neuron*, 71 (2), 370-379.

- Thomas J. Walsh, Kaushik Subramanian, Michael L. Littman and Carlos Diuk (2010). **Generalizing Apprenticeship Learning across Hypothesis Classes**. *Proceedings of the Twenty-Seventh International Conference on Machine Learning (ICML-10),* Haifa, Israel.

- Carlos Diuk, Lihong Li and Bethany R. Leffler (2009). **The Adaptive k-Meteorologists Problem and Its Application to Structure Learning and Feature Selection in Reinforcement Learning.** *Proceedings of the Twenty-Sixth International Conference on Machine Learning (ICML-09),* Montreal, Canada.

- Thomas Walsh, Istvan Szita, Carlos Diuk and Michael Littman (2009). **Exploring compact reinforcement-learning representations with linear regression.** *Proceedings of the Twenty-Fifth Conference in Uncertainty in Artificial Intelligence (UAI-09),* Montreal, Canada.

- Carlos Diuk, Andre Cohen and Michael Littman (2008). **An Object-Oriented Representation for Efficient Reinforcement Learning.** *Proceedings of the Twenty-Fifth International Conference on Machine Learning (ICML-08),* Helsinki, Finland.

- Carlos Diuk and Michael Littman (2009). **Hierarchical Reinforcement Learning.** *Encyclopedia of Artificial Intelligence, IGI Global*. Juan R. Rabuñal, Julian Dorado, Alejandro Pazos (Eds.)

- Alexander L. Strehl, Carlos Diuk and Michael L. Littman (2007). **Efficient Structure Learning in Factored-state MDPs.** *Proceedings of the Twenty-Second AAAI Conference on Artificial Intelligence*, Vancouver, Canada.

- Carlos Diuk, Alexander Strehl and Michael Littman (2006). **A Hierarchical Approach to Efficient Reinforcement Learning in Deterministic Domains.** *Proceedings of the Fifth International Joint Conference on Autonomous Agents and Multiagent Systems.* Hakodate, Japan.

- Carlos Diuk and Enrique Tándeter (2002). **Computer tools for reconstructing a genealogy.** *International Journal of History and Computing*, 12 (3), 329-346.

Peer-reviewed full-paper Workshops and Technical Reports

- David Wingate, Carlos Diuk, Timothy O'Donnell, Joshua Tenenbaum and Samuel Gershman (2013). **Compositional policy priors.** *MIT CSAIL Technical Report 2013-007.*

- Ivan Raskovsky, Diego Fernández Slezak, Carlos Diuk and Guillermo Cecchi (2010). **The emergence of the modern concept of introspection: a quantitative linguistic analysis.** *North American Association for Computational Linguistics Young Researchers Workshop.* Los Angeles, CA, USA.

- John Mark Agosta, Carlos Diuk, Jaideep Chandrashekar and Carl Livadas (2007). **An adaptive anomaly detector for worm detection.** *Second Workshop on Systems and Machine Learning*. Cambridge, MA, USA.

- Carlos Diuk, Michael L. Littman, Alexander L. Strehl (2006). **Efficient exploration and learning of structure in factored-state MDPs.** *Towards a New Reinforcement Learning Workshop (NIPS-06).* Vancouver, Canada.

- Carlos Diuk, Michael L. Littman, and Alexander L. Strehl (2005). **A Hierarchical Approach to Efficient Reinforcement Learning in Factored State Spaces.** *Rich Representations for Reinforcement Learning Workshop (ICML-05).* Bonn, Germany.

Abstracts, Workshop Presentations and Posters

- Carlos Diuk, Debbie Yee, José Ribas-Fernandes, Natalia Cordova, Anna Schapiro, Yael Niv, Matthew Botvinick (2012). **Divide and Conquer: Task Decomposition in Humans**. *Society of Neuroscience Meeting 2012 (38) 592.20*. New Orleans, LA, USA.

- Carlos Diuk, Matthew Botvinick and Yael Niv (2011). **Two coincident but separable reward prediction errors in human ventral striatum**. *Society of Neuroscience Meeting 2011 (37) 827.14*. Washington, DC, USA.

- Carlos Diuk, José Ribas-Fernandes, Natalia Córdova, Matthew Botvinick and Yael Niv (2011). **Hierarchical behavior and the brain: a reinforcement learning perspective.** *Computational and Systems Neuroscience (Cosyne-2011)*. Salt Lake City, Utah.

- Carlos Diuk, Matthew Botvinick, Andrew Barto and Yael Niv (2010). **Hierarchical Reinforcement Learning: An fMRI Study of learning in a two-level gambling task.** *Society of Neuroscience Meeting 2010 (36) 907.14*. San Diego, CA, USA.

- Carlos Diuk (2009). **Tools for learning reinforcement learning representations**. *Fourth Barbados Workshop on Reinforcement Learning*. Holetown, Barbados.

- Carlos Diuk (2008). **Object-oriented MDPs**. *Third Barbados Workshop on Reinforcement Learning*. Holetown, Barbados.

- Thomas J. Walsh, Carlos Diuk and Michael Littman (2006). **Using Classifiers to Transfer Knowledge**. *New York Academy of Sciences Machine Learning Symposium*. New York, NY, USA.

Teaching

2013	PSY/NEU 259 Assistant Instructor – Introduction to Cognitive Neuroscience. *Princeton University*
2012	Visiting Professor – University of Buenos Aires
2012	Instructor and co-Organizer. *Princeton-Champalimaud Reinforcement Learning course. Lisbon, Portugal.*

2010 COMPUTER SCIENCE WINTER SCHOOL (ECI 2010) - UNIVERSITY OF BUENOS AIRES. *Invited to teach the course "Reinforcement Learning: Theory and Applications in Robotics, Games and Neuroscience."*

2008 RUTGERS UNIVERSITY – NEW BRUNSWICK. *Co-organizer of "Bayesian Reinforcement Learning" seminar.*

2003-04 RUTGERS UNIVERSITY – NEW BRUNSWICK. *Teaching Assistant for senior undergraduate class "Design & Analysis of Algorithms". Worked with Professors Martin Farach-Colton, S. Muthukrishnan and Leonid Kachiyan.*

1999-02 UNIVERSITY OF BUENOS AIRES. *Teaching Assistant and Instructor for first-year course "Algortihms and Data Structures 1". Position obtained in annual contests.*

STUDENT MENTORING

- Advisor for Anthony Lenton's MSc in Data Mining at U. of Buenos Aires (ongoing)
- Co-advisor (with Yael Niv) for Dominic Kao's MSc in Computer Science at Princeton University (2011).
- Advisor for Pablo Rodriguez Zivic's Licenciatura in Computer Science at the University of Buenos Aires (2010).
- Mentor of a group of high-school students of New Jersey Governor's School Program of Engineering and Technology (Summer 2009).

SELECTED TALKS

2014 SOCIAL INFORMATICS 2014. *Invited speaker at DYAD Workshop.*

2011 RUTGERS UNIVERSITY - NEW BRUNSWICK. *Reinforcement Learning in the Brain.*

2011 PRINCETON UNIVERSITY. *Neuroscience of Social Decision Making invited speaker.*

2008 UNIVERSITY OF MASSACHUSSETTS - AMHERST. *Invited speaker.*

2008 UNIVERSITAT POMPEU FABRA (Barcelona, Spain).

2006 AAMAS HIERARCHICAL AGENTS WORKSHOP. *Invited speaker.*

2005 UNIVERSIDAD DE BUENOS AIRES (Argentina).

SERVICE AND PROFESSIONAL ACTIVITIES

- Ad-hoc Journal Reviewer:
  Journal of Neuroscience, Cognition, *Neurocomputing*, *Trends in Cognitive Sciences (TICS), Journal of Artificial Intelligence Research (JAIR), Adaptive Behavior, Artificial Intelligence*, *Journal of Autonomous Agents and Multiagent Systems (JAAMAS), Frontiers in Decision Neuroscience*
- Conference Reviewer / Program Committee member:
  Neural Information Processing Systems (NIPS, multiple)
  International Conference on Machine Learning (ICML 2010-2014)
  European Conference in Machine Learning (ECML, multiple)
  European Workshop on Reinforcement Learning (EWRL 2011, 2012)
  Association for the Advancement of Artificial Intelligence (AAAI, multiple)
  International Joint Conference in Artificial Intelligence (IJCAI 2011)
  Artificial Intelligence and Statistics (AI-Stats 2011)

Intn'l Conf. on Pattern Recognition Apps and Methods (ICPRAM 2012, 2013)
International Conference on Robotics and Automation (ICRA 2011)

- Program Committees:
  AAAI-11 Workshop on Lifelong Learning from Sensorimotor Experience
  ICML/UAI/COLT-09 Workshop on Abstraction in Reinforcement Learning
  AAAI Video Competition (2008, 2009, 2010)
  ECAI-08 Workshop on Machine Learning and Planning
- Grant evaluator for Netherlands Organization for Scientific Research (NWO) – 2012.
- Grant evaluator for PICT 2010 (Argentina's Agency for Science and Technology Promotion) and UBACyT 2012 (University of Buenos Aires) grant programs.
- Evaluator of candidate Researchers for Argentina's Research Council.
- Chair – Technical Committee of the Reinforcement Learning Competition (2009).
- Judge in Princeton Undergraduate Research Symposium (2011).
- President of the Graduate Student Association of Rutgers University (2006-2008).
- President of the Computer Science Graduate Student Society of Rutgers University (2004-05).
- Student member of the Computer Science Governing Council at University of Buenos Aires (elected for three consecutive periods, 1998-2001).