

Noam Miller

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EDUCATION

University of Toronto, Toronto, ON, Canada. Department of Psychology.

2005 – 2010: Ph.D.

2004 – 2005: M.A.

Thompson Rivers University, BC, Canada. Faculty of Arts.

2000 – 2003: B.Mus. in Performance.

The Glenn Gould School at the Royal Conservatory of Music, Toronto, ON, Canada.

1998 – 2002: Performance Diploma (Clarinet).

Tel-Aviv University, Tel-Aviv, Israel. Faculty of Life Sciences.

1994 – 1997: B.Sc. in Biology.

RESEARCH EXPERIENCE

Princeton University, Princeton, NJ. Department of Ecology & Evolutionary Biology.

2012 – 2014: Post-Doctoral Researcher (NSF). Supervisor: Iain Couzin.

2010 – 2012: NSERC Post-Doctoral Research Fellow. Supervisor: Iain Couzin.

Focusing on collective learning and mechanisms of collective intelligence.

University of Toronto, Toronto, ON, Canada. Department of Psychology.

2005 – 2010: Doctoral research. Supervisor: Robert Gerlai.

Focusing on the characterization and measurement of schooling in zebrafish and the effects of environmental conditions on schooling.

2004 – 2005: Master's research. Supervisor: Sara Shettleworth

Experiments and modeling of geometry learning in rats (and generally).

2000 – 2004: Research assistant for Sara Shettleworth.

Focusing on the interactions between spatial memory systems in rats, hamsters, and pigeons; creating custom data-analysis and operant-box software.

Tel-Aviv University, Tel-Aviv, Israel. Department of Zoology.

1996 – 1998: Undergraduate research and research assistant for Ilan Golani.

Focusing on the function of the hippocampus in spatial memory in rats, specifically in the exploration of novel environments.

PUBLICATIONS

- Miller N (in press). Raising the bar on studying cultural evolution. *Learning & Memory*.
- Miller N (2017). Cognition in fishes. [introduction to special issue on fish cognition]. *Behavioral Processes*, 141:137-140.
- White DJ, Watts E, Pitchforth K, Agyapong S, Miller N (2017). 'Sociability' affects the intensity of mate-choice copying in female guppies, *Poecilia reticulata*. *Behavioural Processes*, 141:251-257.
- Guayasamin OL, Couzin ID, Miller N (2017). Behavioural plasticity across social contexts is regulated by the directionality of inter-individual differences. *Behavioural Processes*, 141:196-204.
- Kao A, Miller N, Torney C, Hartnett A, Couzin ID (2014). Collective Learning And Optimal Consensus Decisions In Social Animal Groups. *PLoS Computational Biology*, 10(8): doi:10.1371/journal.pcbi.1003762
- Miller N, Shettleworth SJ (2013). An associative model of instrumental choice: a response to Dupuis and Dawson. *Journal of Experimental Psychology: Animal Behavior Processes*, 39, 287-293.
- Miller N, Garnier S, Hartnett A, Couzin ID (2013). Both information and social cohesion determine collective decisions in animal groups. *PNAS*, 110, 5263-5268.
- Kalueff AV, Gebhardt M, Stewart AM, Cachat JM, Brimmer M, Chawla JS, Craddock C, Kyzar EJ, Roth A, Landsman A, Gaikwad S, Robinson K, Baatrup E, Tierney K, Shamchuk A, Norton W, Miller N, Nicolson T, Braubach O, Gilman CP, Pittman J, Rosemberg DB, Gerlai R, Echevarria D, Lamb E, Neuhauss SCF, Weng W, Bally-Cuif L, Schneider H, ZIRC (2013). Towards a comprehensive catalog of zebrafish behavior 1.0, and beyond. *Zebrafish*, 10, 70-86.
- Miller N*, Greene K*, Dydinski A, Gerlai R (2013). Effects of nicotine and alcohol on zebrafish (*Danio rerio*) schooling. *Behavioural Brain Research*, 240, 192-196. [*Co-first authors]
- Miller N, Gerlai R (2012a). From schooling to shoaling: patterns of collective motion in zebrafish (*Danio rerio*). *PLoS ONE*, 7(11): doi:10.1371/journal.pone.0048865
- Miller N, Gerlai R (2012b). Automated tracking of zebrafish shoals and the analysis of shoaling behavior. In A.V. Kalueff, & A.M. Stewart (Eds.), *Zebrafish Protocols for Neurobehavioral Research*. New York: Humana Press.
- Miller NY, Gerlai R (2011a). Redefining membership in animal groups. *Behavior Research Methods*, 43, 964-970.
- Miller NY, Gerlai R (2011b). Shoaling in zebrafish: what we don't know. *Reviews in the Neurosciences*, 22, 17-25.
- Miller NY (2009). Modeling the effects of enclosure size on geometry learning. *Behavioral Processes*, 80, 306-313.
- Miller NY, Gerlai R (2008). Oscillations in shoal cohesion in zebrafish (*Danio rerio*). *Behavioural Brain Research*, 193, 148-151.
- Miller NY, Shettleworth SJ (2008). An associative model of geometry learning: a modified choice rule. *Journal of Experimental Psychology: Animal Behavior Processes*, 34, 419-422.
- Miller NY, Gerlai R (2007). Quantification of shoaling behavior in zebrafish (*Danio rerio*). *Behavioural Brain Research*, 184, 157-166.

Miller NY, Shettleworth SJ (2007). Learning about Environmental Geometry: An Associative Model. *Journal of Experimental Psychology: Animal Behavior Processes*, 33, 191-212.
Skov-Rackette SI, Miller NY, Shettleworth SJ (2006). What-where-when memory in pigeons. *Journal of Experimental Psychology: Animal Behavior Processes*, 32, 345-358.

TEACHING EXPERIENCE

Wilfrid Laurier University, Waterloo, ON. Department of Psychology.

2015 – present: Course instructor for PS261, “Introduction to Learning” (Every Fall & Winter term since Winter 2015), PS263, “Biopsychology” (Winter 2015, Fall 2015, Fall 2016, Winter 2017), PS461, “Seminar in Learning” (Winter 2016), and PS861, “Seminar in Comparative Cognition” (Fall 2017). Full responsibility for designing the course, creating course content, delivering the lectures, etc.

Princeton University, Princeton, NJ. Department of Ecology & Evolutionary Biology.

2011 – 2014: Supervised three undergraduate thesis students. Assisted them in designing experiments and analyzing their data. Studies involved the effects of behavioral syndromes on collective motion in zebrafish and the combined effects of hunger and information levels on collective decisions in Golden shiners.

2011, 2012: Guest lectured on “Collective Learning” and “Collective Decision-Making” in EEB323 “Integrative Dynamics of Animal Behavior”.

University of Toronto Mississauga, Mississauga, ON, Canada. Department of Psychology.

2009 – 2010: Supervised two undergraduate research thesis students. Both projects involved studying the effects of alcohol and nicotine on collective behavior in zebrafish. This work has been published (Miller et al., 2013, *BBR*).

2006, 2007, 2009: Course instructor for PSY 362, “Animal Cognition”. Full responsibility for designing the course, creating course content, delivering the lectures, etc.

2004 – 2010: Teaching Assistant. PSY 100 (Introduction to Psychology), 252 (Introduction to Animal Behavior), 255 (Animal Behavior), 260 (Learning & Cognition), 355 (Animal Behavior Genetics), 362 (Animal Cognition), 369 (Conditioning & Learning Laboratory), 393 (Human Neuropsychology), 397 (Neuroplasticity).

SELECTED AWARDS

2016 – 2017: Banting Research Foundation Discovery Award “Exploring neural mechanisms of social behavior using zebrafish (*Danio rerio*)”. Grant author and Principal Investigator.

2016 – 2020: NSERC Discovery Grant “Collective learning and decision-making in animal groups”. Grant author and Principal Investigator.

2012 – 2014: NSF collaborative research grant, “The Perceptual Basis of Collective Behavior in a Model Vertebrate” (grant co-author).

2010 – 2012: NSERC Post-Doctoral Fellowship, “The Dynamics of Schooling”

2008 – 2009; 2009 – 2010: Ontario Graduate Scholarship.

SELECTED RECENT PRESENTATIONS

- “Out of sight, out of mind: flexible use of social information and learning in zebrafish”. Talk given at the Animal Behavior Society meeting. Scarborough, ONT, Canada; June 2017.
- “Social information use in fish”. Public lecture delivered as part of the Royal Canadian Institute for Science RCIScience Talks series, Toronto, ONT. February 12, 2017 [YouTube: <https://www.youtube.com/watch?v=KsWNhnFpIXo#t=44m40s>].
- “Information is information: how pigeons combine personal and ‘social-like’ cues”. Talk given at the Conference on Comparative Cognition, Melbourne, FL, USA; April 2016.
- “Collective Cognition”. Invited talk given at the Graduate Colloquium series at Brooklyn College (CUNY), New-York, NY, USA; February 2016.
- “Collective Cognition”. Invited talk given at the Leibniz Institute for Freshwater Ecology (IGB), Berlin, Germany; September 2014.
- “Collective learning and the emergence of producer-scrourer dynamics”. Talk given at Collective Intelligence, MIT, Cambridge, MA, USA; June 2014.
- “Collective foraging and the evolution of visual search”. Talk given at Collective Dynamics of Communities and Populations, Princeton University, Princeton, USA; April 2014.
- “Collective Animal Cognition”. Invited talk at the University of Toronto, Ecology and Evolutionary Biology Seminar Series, Toronto, Canada; February 2014.
- “Collective Learning”. Invited talk at the UOIT Modeling and Computational Science Seminar Series, Oshawa, Canada; October 2012.

PROFESSIONAL MEMBERSHIPS

Animal Behavior Society
Comparative Cognition Society
International Behavior Neuroscience Society
Society for Neuroscience

AS A REVIEWER

American Naturalist (2015)
Animal Cognition (2013-2016)
Behavior (2012)
Behavioral Brain Research (2009, 2011-2013, 2015)
Behavioral Ecology (2016)
Behavioral Processes (2008-2009, 2012, 2014-2015, 2017)
Behavior Research Methods (2010, 2013)
Cognition (2016)
Current Biology (2016)
Current Zoology (2013)
eLife (2017)
Frontiers in Psychology (2015-2016)
Humana Press (for the book *Zebrafish Protocols for Neurobehavioral Research*; 2011)
Journal of Comparative Psychology (2017)
Journal of Experimental Biology (2017)
Journal of Experimental Psychology: Animal Behavior Processes (2007-2009, 2012-2013)

Journal of Experimental Psychology: Animal Learning & Cognition (2015-2016)
Journal of Fish Biology (2012)
Learning & Behavior (2014)
Learning & Motivation (2014)
MIT Press (2014)
Physiology & Behavior (2012)
PLoS One (2012-2014, 2016)
Progress in Neuro-Psychopharmacology & Biological Psychiatry (2014)
Psychological Review (2009)
Scientific Reports (2015-2017)
Zebrafish (2013, 2014, 2017)

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