

## Matthijs (Matt) van der Meer

Assistant Professor and Canada Research Chair (Tier II)  
Department of Biology & Centre for Theoretical Neuroscience,  
Department of Systems Design Engineering (cross-appointed)

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### Professional appointments

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Assistant Professor Department of Psychological and Brain Sciences, Dartmouth College	Jan 2015-
Assistant Professor Department of Biology, University of Waterloo	Sept 2010-Dec 2014
Post-doctoral associate Department of Neuroscience, University of Minnesota Mentor: A. David Redish	2007-2010

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### Education

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Ph.D. in Neuroinformatics Neuroinformatics Doctoral Training Centre, University of Edinburgh, UK Thesis title: "Neural compass or epiphenomenon? Experimental and theoretical investigations into the rodent head-direction system". Advisors: Mark van Rossum, Emma Wood; Examiners: Neil Burgess (University College London), Mayank Dutia (Edinburgh)	2003-2007
<i>Neural Systems &amp; Behavior summer course</i> Marine Biological Laboratory, Woods Hole, USA	2005
M.Sc. in Neuroinformatics ( <i>with distinction</i> ) Neuroinformatics Doctoral Training Centre, University of Edinburgh	2002-2003
M.Sc. in Informatics ( <i>with distinction</i> ) School of Informatics, University of Edinburgh	2001-2002
<i>Exchange trimester</i> University of California, San Diego, USA Focus: Artificial Intelligence, Cognitive Science	2000
B.Sc. in Science ( <i>cum laude</i> ) University College Utrecht, the Netherlands	1998-2001

## Publications

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22. van der Meer MA, Ito R, Lansink CS, Pennartz CMA (in press) Hippocampal projections to the ventral striatum: from spatial memory to motivated behavior. *Invited Contribution for "Space, Time & Memory in the Hippocampal Formation" (Knierim JJ and Derdikman D, eds.), Springer.*
21. Caze R, van der Meer MA (2013) Adaptive properties of differential learning rates for positive and negative outcomes. *Biological Cybernetics* 107(6): 711-719
20. Catanese J, van der Meer MA (2013) A network state linking motivation and action in the nucleus accumbens (Invited *Preview* of McGinty et al.) *Neuron* 78(5): 753-754
19. Ogawa M, van der Meer MA, Esber GR, Cerri DH, Stalnaker TA, Schoenbaum G (2013) Risk-responsive orbitofrontal neurons signal acquired salience. *Neuron* 77(2): 251-8
18. van der Meer MA, Kurth-Nelson Z, Redish AD (2012) Information processing in decision-making systems. *The Neuroscientist* 18 (4): 342-359
17. Gupta AS, van der Meer MA, Touretzky DS, Redish AD (2012) Segmentation of spatial experience by hippocampal theta sequences. *Nature Neuroscience* 15: 1032-1039
16. Malhotra S, Cross RW, van der Meer MA (2012) Theta phase precession beyond the hippocampus. *Reviews in the Neurosciences* 23(1): 39-65
15. van der Meer MA, Redish AD (2011) Ventral striatum: a critical look at models of learning and evaluation. *Current Opinion in Neurobiology* 21(3): 387-92
14. van der Meer MA, Redish AD (2011) Theta phase precession in rat ventral striatum links place and reward information. *Journal of Neuroscience* 31(8): 2843-2854
13. van der Meer MA, Johnson A, Schmitzer-Torbert NC, Redish AD (2010) Triple dissociation of information processing in dorsal striatum, ventral striatum, and hippocampus on a learned spatial decision task. *Neuron* 67(1): 25-32
12. van der Meer MA, Kalenscher T, Lansink CS, Pennartz CMA, Berke JD, Redish AD (2010) Integrating early results on ventral striatal gamma oscillations in the rat. *Frontiers in Neuroscience* 15(4): 300
11. van der Meer MA, Redish AD (2010) Expectancies in decision making, reinforcement learning, and ventral striatum. *Frontiers in Neuroscience* 15(4): 6
10. Gupta AS, van der Meer MA, Touretzky DS, Redish AD (2010) Hippocampal replay is not a simple function of experience. *Neuron* 65(5): 695-705  
 \*Spotlighted in a Preview by Derdikman and Moser, *Neuron* 65(5):582-584  
 \*Evaluated "Must Read" on *Faculty of 1000*, [www.f1000.com](http://www.f1000.com)
9. van der Meer MA, Richmond Z, Braga RM, Wood ER, Dudchenko PA (2010) Evidence for the use of an internal sense of direction in homing. *Behavioral Neuroscience* 124(1): 164-169

8. Pennartz CMA, Berke JD, Graybiel AM, Ito R, Lansink CS, van der Meer MA, Redish AD, Smith K, Voorn P (2009) Corticostriatal interactions during learning, memory processing and decision-making. *Journal of Neuroscience* 29: 12831-12838
7. van der Meer MA, Redish AD (2009b) Low and high gamma oscillations in rat ventral striatum have distinct relationships to behavior, reward, and spiking activity on a learned spatial decision task. *Frontiers in Integrative Neuroscience* 3(9): doi:10.3389/neuro.07.009.2009  
\*Selected for *Focused Review* in *Frontiers in Neuroscience*.
6. van der Meer MA, Redish AD (2009a) Covert expectation-of-reward in rat ventral striatum at decision points. *Frontiers in Integrative Neuroscience* 3(1): doi:10.3389/neuro.07.001.2009.  
\*Selected for *Focused Review* in *Frontiers in Neuroscience*.
5. Johnson A, van der Meer MA, Redish AD (2008) Integrating hippocampus and striatum in decision-making. *Current Opinion in Neurobiology* 17(6): 692-7
4. van Rossum MC, van der Meer MA, Xiao D, Oram MW (2008) A model for adaptive integration in the visual cortex by depressing recurrent cortical circuits. *Neural Computation* 20(7): 1847-72
3. van der Meer MA, Knierim JJ, Doreswamy Y, Wood ER, van Rossum MC (2007) Anticipation in the rodent head direction cell system can be explained by an interaction of head movements and vestibular firing properties. *Journal of Neurophysiology* 98: 1883-97
2. Ainge JA, van der Meer MA, Langston RF, Wood ER (2007) Exploring the role of context-dependent hippocampal activity in spatial alternation behavior. *Hippocampus* 17(10): 988-1002
1. van der Meer MA, van Atteveldt WH, Coopmans PH, Philip WC (2001) Subject-Object asymmetry in Dutch children's comprehension of *wie*-questions. *Linguistics in the Netherlands* 18(1): 167-176

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**Research Support**


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Team leader, HFSP Young Investigator Grant Collaboration with Dr. Caleb Kemere and Dr. Giovanni Pezzulo (*Full team amount)	\$1,050,000*	2014-2016
Ontario Early Researcher Award	\$150,000	2014-2016
Discovery Grant National Science and Engineering Research Council (NSERC)	\$160,000	2012-2017
Canada Research Chair (Tier II, NSERC) (*Used primarily for salary support)	\$500,000*	2011-2016
Canada Foundation for Innovation (CFI) Leaders Opportunity Fund	\$50,000	2011
Ontario Research Fund (ORF) Research Infrastructure	\$50,000	2012
“VENI” Innovational Research Incentive, Netherlands Organisation for Scientific Research (NWO) (*Original award amount; reduced to ~€80,000 following move to Canada)	€250,000*	2011-2015

## Teaching

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BIOL 377, Systems Neuroscience: from neurons to behavior Department of Biology, University of Waterloo (developed new course, including interactive simulations and data exploration assignments)	Winter 2012-present
BIOL 678, Current Topics in Neurophysiology Department of Biology, University of Waterloo (*co-taught with Dr. David Spafford)	Fall 2011-present
BIOL 680/1, Data Analysis for Neuroscience Department of Biology, University of Waterloo (developed new course with hands-on, wiki-based tutorials using lab data)	Fall 2013-present
Components of various team-taught courses (e.g. Scientific Communication)	Fall 2010-present
Course tutor Okinawa Computational Neuroscience Course, Okinawa Institute for Science and Technology, Japan ( <a href="http://www.irlp.oist.jp/ocnc/2010/">http://www.irlp.oist.jp/ocnc/2010/</a> )	2009-2010

## Trainees mentored

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### Post-doctoral:

Julien Catanese, Post-doctoral fellow <i>*FYSSSEN foundation fellowship award (France)</i>	2012-present
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### Graduate:

Eric Carmichael, Biology (PhD)	2013-present
Jimmie Gmaz, Biology (PhD) <i>*NSERC Canada Graduate Scholarship (CGS-D) award recipient</i>	2013-present
Alyssa Carey, Biology (MSc)	2013-present
Rob Cross, Biology (MSc)	2011-2013
Sushant Malhotra, Systems Design Engineering (MAsc) <i>*NSERC (CGS-M &amp; CGS-D) award recipient</i>	2011-2013
Yan Wu, Systems Design Engineering (MSc) (joint w/Chris Eliasmith; now PhD student, University of Cambridge, UK)	2010-2012

Undergraduate:

7 full-time/single-term research assistants (NSERC USRA awards) 2011-present

8 Honours thesis students (BIOL 499) 2011-present

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**Invited talks, workshops**

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| 32. Canadian Association for Neuroscience, Montreal  | 2014 |
| 31. School of Informatics, Edinburgh, UK   | 2014 |
| 30. Psychological and Brain Sciences seminar series, Dartmouth College, NH   | 2013 |
| 29. Psychology & Neuroscience Seminar, Dalhousie University, Halifax, NS   | 2013 |
| 28. Neuroscience and Applied Cognitive Science seminar series, University of Guelph  | 2013 |
| 27. Donders Institute for Brain, Cognition, and Behavior, Nijmegen, Netherlands  | 2013 |
| 26. Neuroscience seminar series, Technion, Haifa, Israel   | 2013 |
| 25. Southern Ontario Neuroscience Association (SONA) annual meeting, Waterloo, ON  | 2013 |
| 24. Spring Hippocampal Research Conference, Taormina, Italy  | 2013 |
| 23. Department of Psychology seminar series, McMaster University, Hamilton, ON   | 2013 |
| 22. FieldTrip workshop, York University, Toronto, ON   | 2013 |
| 21. Participant, Cognitive Neuroscience workshop, Mathematical Biosciences Institute, Columbus, OH   | 2012 |
| 20. Douglas Institute for Mental Health, Montréal, QC  | 2012 |
| 19. Rotman Research Institute/Baycrest Hospital Rounds, Toronto, ON  | 2012 |
| 18. INCF Canadian Neuroinformatics Workshop, Vancouver, BC   | 2012 |
| 17. Swammerdam Institute for Life Sciences, University of Amsterdam, Netherlands   | 2012 |
| 16. Brain and Behaviour Seminar Series, University of Toronto, ON  | 2012 |
| 15. Champalimaud Institute for the Unknown, Lisbon, Portugal   | 2011 |
| 14. Neuromorphic Cognition Engineering Workshop, Telluride, CO   | 2011 |
| 13. National Institute on Drug Abuse (NIDA), Baltimore, MD   | 2011 |
| 12. Wilfrid Laurier University, Waterloo, ON   | 2011 |
| 11. “How Do Multiple Cortico-Basal Ganglia Loops Support Learning Across a Wide Range of Functional Domains?” workshop, <i>CoSyNe</i> 2011 | 2011 |
| 10. Department of Computer Science and Center for Neural Basis of Cognition, Carnegie Mellon University, Pittsburgh, PA                    | 2010 |
| 9. HHMI Janelia Farm Research Campus, Ashburn, VA  | 2010 |
| 8. University of Maryland School of Medicine, Baltimore, MD  | 2010 |
| 7. Cognitive Neuroscience sector, SISSA, Trieste, Italy  | 2010 |
| 6. Bernstein Center for Computational Neuroscience, Munich, Germany  | 2010 |
| 5. “Emerging principles of memory organization” workshop, <i>CoSyNe</i> 2010   | 2010 |
| 4. Centre for Theoretical Neuroscience and Department of Biology, University of Waterloo, Canada   | 2010 |
| 3. “Cortico-striatal Interactions During Learning and Memory Processing” mini-symposium, Society for Neuroscience Annual Meeting, Chicago  | 2009 |
| 2. Neuroinformatics Doctoral Training Centre Day, Edinburgh, UK  | 2009 |
| 1. Participant, <i>Workshop on Open Problems in Decision-Making</i> , Okinawa Institute of Science and Technology, Japan                   | 2008 |

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**Service (external)**


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Associate Editor, Circuits/Systems section, *Journal of Neuroscience* 2014-current

Ad hoc manuscript reviewer for *Journal of Neurophysiology*, *Frontiers in Neuroscience*, *Neuron*, *Behavioral Brain Research*, *Neuropharmacology*, *Biological Psychiatry*, *Neuroscience*, *Cerebral Cortex*, *NeuroSignals*, *Journal of Visualized Experiments (JoVE)*, *Journal of Neuroscience* (\*Frequent Reviewer, 2012, 2013), *Biological Cybernetics*, *Neurobiology of Aging*, *PLoS ONE*, *PLoS Computational Biology*, *Child Development*, *Behavioral Neuroscience*, *European Journal of Neuroscience*, *Behavioral Neuroscience*

Ad hoc grant application reviewer for *Natural Sciences and Engineering Research Council (NSERC, Canada)*, *Agence Nationale de Recherche (ANR, France)*, *Wellcome Trust (UK)*, *Netherlands Organisation for Scientific Research (NWO)*

Faculty and co-organizer, rodent hippocampus cycle, *Neural Systems and Behavior* 2014  
summer course, Marine Biological Laboratory, Woods Hole, MA

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**Service (internal)**


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Member, Animal Care Committee 2012-current

Member, Central Animal Facility Advisory Committee 2011-current

Workshop facilitator, Centre for Co-operative Education & Career Action 2012-current  
“So, you want to be an academic?”

“Internal-External” examiner (PhD), Department of Psychology; Department of Statistics