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RESEARCH INTERESTS

The overarching goal of my research is to discover the neural mechanisms that underlie sensory-evoked natural behaviors and how they are affected by prior experience and current internal state. I have used wireless electrophysiological recordings in freely jumping locusts and freely swimming weakly electric fish, as well as electrochemical (voltammetry) techniques to address some of these questions in the past. For my current postdoctoral research, I am using two photon calcium imaging to characterize the neural mechanisms that underlie habituation of visually-evoked escape behaviors in larval zebrafish.

EDUCATION

- 2010** **Ph.D. in Neuroscience**, Baylor College of Medicine, Houston, TX
Supervisor: Fabrizio Gabbiani, Professor of Neuroscience
Thesis: “Neural Mechanisms Underlying Visually Evoked Escape Behaviors”
- 2002** **M.Sc. in Electrical and Computer Engineering**, University of Houston, Houston, TX
Graduate Certificate in Cognitive Neuroscience
- 1998** **B.S., Electrical and Computer Engineering**, Amirkabir University of Technology, Tehran, Iran

RESEARCH EXPERIENCE

- 2016-** **Postdoctoral Fellow**, Harvard University, Cambridge, MA
Faculty Advisor: Florian Engert, Professor of Molecular and Cellular Biology
- 2014-16** **Research Associate**, University of Ottawa, Ottawa, ON
Faculty Advisor: Leonard Maler
- 2010-14** **Postdoctoral Associate**, McGill University, Montreal, QC
Faculty Advisor: Rüdiger Krahe, Associate Professor of Behavioural Physiology
- 2013** **Visiting Scientist**, University of Maryland, Baltimore, MD
Faculty Advisor: Joseph Cheer, Associate Professor of Anatomy and Neurobiology
- 2010** **Grass Fellow**, Marine Biological Laboratories, Woods Hole, MA

PUBLICATIONS

Peer-reviewed journals

1. **Fotowat H.**, Lee C, Jun JJ, Maler L. “Neural activity in a hippocampus-like region of the teleost pallium is associated with active sensing and navigation”. *eLife*, 2019; 8:e44119.
2. **Fotowat H.**, Harvey-Girard E., Cheer J.F., Krahe R., Maler L. “Sub-second sensory modulation of serotonin levels in a primary sensory area and its relation to ongoing communication behavior in a weakly electric fish” *eNeuro*, 2016, eNeuro 0115-16.2016.
3. **Fotowat H.**, Harrison R.R., Krahe R. “Statistics of electrosensory input in freely swimming weakly electric fish *Apteronotus leptorhynchus*” *J. Neuroscience*, 2013, 33(34) 13758-13772.
4. **Fotowat H.**, Harrison R.R., Gabbiani F. “Multiplexing of motor information in the discharge of a collision detecting neuron during escape behaviors” *Neuron*, 2011, 69(1):147-58.
5. **Fotowat H.**, Gabbiani F. “Collision detection as a model for sensory-motor integration” *Annual Reviews of Neuroscience*, 2011, 34:1-19.
6. Harrison, R.R., **Fotowat H.**, Chan R., Kier R.J., Olberg R., Leonardo A., Gabbiani F. “Wireless neural/EMG telemetry systems for small freely moving animals” *IEEE Transactions on Biomedical Circuits and Systems*, 2011, 5(2):103-111.
7. **Fotowat H.***, Fayyazuddin A.*, Bellen H.J., Gabbiani F. “A novel neuronal pathway for visually guided escape in *Drosophila*”, *Equal contribution. *J. Neurophysiology*, 2009, 102:875-885.
8. **Fotowat H.**, Gabbiani F. “Relationship between the phases of sensory and motor activity during a looming-evoked multistage escape behavior” *J. Neuroscience*, 2007, 27(37): 10047-10059.

Conference Proceedings

- Harrison R.R., **Fotowat H.**, Chan R., Kier R.J., Leonardo A., and Gabbiani F. “A wireless neural/EMG telemetry system for freely moving insects” Proceedings of the IEEE International Symposium on Circuits and Systems, Paris, France, 2010.
- Fotowat H.**, Harrison R.R., Gabbiani F. “Measuring neural correlates of insect escape behaviors using a miniature telemetry system” Proceedings of the 35th Annual IEEE Northeast Bioengineering conference, Boston, MA, 2009.
- Zhong R., Liu R., **Fotowat H.**, Gabbiani F., “A micro ultra low power RF radio for neural signal recording” Proceedings of the First International Conference on Biomedical Electronics and Devices, Funchal, Portugal, 2008.
- Parikh D., **Fotowat H.**, Gabbiani F., Wolfe J., “A multi- electrode cuff for neuronal sensing in the locust” Proceedings of the International Conference on Electron, Ion, and Photon Beam Technology and Nano-Fabrication, Portland, OR, 2008.
- Fotowat H.**, Ogmen H., Bedell HE, Breitmeyer BG., “Luminance dependence of oscillatory dynamics in the human visual system” Proceedings of the 1st International IEEE EMBS Special Topic Conference on Neural Engineering, Capri Island, Italy, 2003.

Book chapters

- Fotowat H.**, Ogmen H., Bedell HE, Breitmeyer BG. “Probing oscillatory visual dynamics at the perceptual level” *IEEE Handbook of Neural Engineering*, chapter 38, 615-625, 2007.

PRESENTATIONS

Oral Presentations

- “Neural mechanisms underlying visually-evoked escapes in larval zebrafish” Society for Neuroscience, San Diego, CA, 2018.
- “Habituation of looming-evoked escapes in larval zebrafish” Neurotuscan, Montecastelli Pisano, Italy, 2017-2018.
- “Spatial navigation in weakly electric fish” Neurotuscan, Montecastelli Pisano, Italy, 2016.
- “Sensory-evoked serotonin dynamics and its relation to ongoing communication behavior” Weakly electric fish meeting, 12th International Congress of Neuroethology, Montevideo, Uruguay, 2016.
- “Tetrode recording from the telencephalon in freely moving fish engaged in a spatial navigation task” International Electric Fish Meeting, Mont St. Hilaire, QC, 2015.
- “Stimulus-evoked serotonin release in the electrosensory lateral line lobe of *Apteronotus leptorhynchus*” International Electric Fish Meeting, Mont St. Hilaire, QC, 2014 and 2015.
- “Wireless recording and computational modeling of natural electrosensory input in freely swimming electric fish” International Workshop on Robotic Electrosense and 10th International Congress of Neuroethology College Park, MD, 2012.
- “Dynamics of the natural electrosensory input in a freely swimming electric fish” International Electric Fish Meeting, Mont St. Hilaire, QC, 2011.
- “Measuring neural correlates of insect escape behaviors using a miniature telemetry system” 35th Annual IEEE Northeast Bioengineering conference, Boston, MA, 2009.

Posters

- Fotowat H.** and Engert F., “Neural mechanisms underlying habituation of looming-evoked escapes” Zebrafish Neural Systems and Behavior Conference. Cold Spring Harbor Laboratory, NY, 2019.
- Fotowat H.**, Jun J. J, Lee C., Maler L., “Relationship between active sensing and spiking activity in the telencephalon of weakly electric fish in the context of spatial navigation.” Conference on Neural Basis of Active Sensation and Navigation. Janelia Research Campus, Ashburn, VA., 2017.
- Fotowat H.**, Harvey-Girard E., Cheer J.F., Krahe R. and Maler L., “Sensory-evoked serotonin dynamics and its relation to ongoing communication behavior” 12th International Congress of Neuroethology, Montevideo, Uruguay, 2016.
- Raab T.**, Sehuanes J.F., Henninger J, Molina J.A. , Fotowat H., Krahe R, Benda J., “Microhabitat distribution of weakly electric fish populations in neotropical habitats” 12th International Congress of Neuroethology, Montevideo, Uruguay, 2016.
- Fotowat H.**, Harvey-Girard E., Cachepe R., Cheer J.F., Krahe R. and Maler L., “Stimulus-evoked serotonin dynamics in a teleost sensory system” Society for Neuroscience, Chicago, IL, 2015.
- Fotowat H.**, Harvey-Girard E., Krahe R. and Maler L., “Dynamics of 5-HT release in the electrosensory system of weakly electric fish, *Apteronotus leptorhynchus*, evoked by sensory stimuli” Society for Neuroscience, Washington, DC, 2014.
- Fotowat H.**, Harrison R.R., Krahe R., “Wireless recording and computational modeling of natural electrosensory input in freely swimming electric fish” 10th International Congress of Neuroethology, College

Park, MD, 2012.

- Fotowat H.**, Harrison R.R., Krahe R., “Dynamics of the natural electrosensory input in a freely swimming weakly electric fish” Society for Neuroscience, Washington, DC, 2011.
- Fotowat H.**, Harrison R.R., Gabbiani F., “Measuring the neural correlates of insect escape behaviors using a miniature wireless telemetry system” Society for Neuroscience, Chicago, IL, 2009.
- Fotowat H.**, Fayyazuddin A., Gabbiani F., “Properties of looming evoked escape behaviors in *Drosophila*”, Conference on using in vivo physiology to understand neural circuits in genetic systems, HHMI, Janelia farm, Ashburn, VA., 2008.
- Fotowat H.**, Fayyazuddin A., Bellen H. J., Gabbiani F., “A novel neuronal pathway for visually guided escape in *Drosophila*” Society for Neuroscience, Washington, DC, 2008.
- Fotowat H., **Gabbiani F.**, “Relation between the phases of sensory and motor activity during a looming evoked multi-stage escape behavior” International Congress of Neuroethology, Vancouver, BC, 2007.
- Fotowat H.**, Gabbiani F., “Relation between the phases of sensory and motor activity during a looming escape behavior” Society for Neuroscience, San Diego, CA, 2007.
- Fotowat H.**, Gabbiani F., “Comparative analysis of activity in a looming sensitive neuron and jump escape behaviors” Society for Neuroscience, Washington, DC, 2005.

TEACHING and ADVISING EXPERIENCE

Teaching Assistant

Led discussion sections, graded assignments, held review sessions, delivered lectures, supervised student laboratories.

Introduction to Systems Neuroscience, Department of Molecular and Cellular Biology, Harvard University. Class size 12 Undergraduate students, 1 graduate student (2019)

Neural Systems and Behavior at the Marine Biological Laboratory.

Class size: 6 graduate students (2011)

Introduction to Neuroscience Methods, Baylor College of Medicine.

Class size ~10 graduate students (2008)

Neurobiology of Sensation and Movement, Dept. of Neuroscience, Baylor College of Medicine.

Class size: ~10 graduate students (2007-08)

Theoretical Neuroscience, Dept. of Neuroscience, Baylor College of Medicine and Rice University.

Class size ~20 graduate students (2005-06)

Signals and Systems, Dept. of Electrical and Computer Engineering, University of Houston.

Class size: ~70 undergraduate students (2000)

Signals and Systems, Dept. of Electrical and Computer Engineering, Tehran Polytechnic.

Class size: ~30 undergraduate students (1997)

Guest lecturer

Neural Circuits for Individuality, NEURO 109B, Harvard University (2017)

Animal Communication, BIOL 507. McGill University (2016)

Advanced Neuroethology, BIOL 530. McGill University (2014)

Pedagogical Training

Science mentoring workshop, Harvard University (2017)

EMBO Lab management course, Harvard University (2017)

Teaching awards

Certificate of distinction in teaching, Harvard University, The Derek Bock center for teaching and learning (2019)

Advising

2018 One Harvard graduate rotation.

2015 One University of Ottawa undergraduate student.

2014 Two McGill University undergraduate students.

2009 One high school student enrolled in a STEM summer program at Baylor College of Medicine

FELLOWSHIPS & AWARDS

Fellowships

NSERC Postdoctoral Fellowship, Natural Science and Engineering Council of Canada (2012)

Grass Fellowship in Neurobiology, Grass Foundation fund that supported independent research during the summer at the Marine Biological Laboratory, Woods Hole, MA

Academic Recognition

BioCAS Best Paper Award, IEEE Circuits and Systems Society, awarded for Harrison, R. R., et al. 2011: 5(2): 103-111 (2013)

Faculty of 1000 article recommendation, Maler L and Marsat G: F1000 Prime recommendation of [Fotowat H et al., *J Neurophysiol* 2009, 102(2):875-85]. In F1000 Prime, 10 Sep 2009; F1000Prime.com/1164699

PROFESSIONAL SERVICE

Peer Reviewing

Journal of Neurophysiology, PLoS Computational Biology, Journal of Experimental Biology

Educational Outreach

Volunteered in Bio-Bus during Cambridge Science festival 2019.

Professional Memberships

Society for Neuroscience (SFN), 2012-

Canadian Association for Neuroscience (CAN), 2016-

International Society for Neuroethology (ISN), 2012-

International Society for Serotonin Research (ISSR), 2015-16

Institute for Electrical and Electronic Engineers (IEEE), 2000-16