

# Timothy W. Dunn

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CONTACT INFORMATION	twdunn@fas.harvard.edu Phone: (818) 796-3866	Biological Laboratories 1008E 16 Divinity Avenue Cambridge, MA 02138
CURRENT APPOINTMENT	<b>Harvard University.</b> College Fellow of Molecular and Cellular Biology. <ul style="list-style-type: none"><li>• Developing deep learning methods for functional connectomics</li><li>• Improving visual stimulation through refractive-index-mismatched media</li><li>• Designing and lecturing course on modern computational techniques for biological data analysis (mcb112.org)</li></ul>	2016 – Present
EDUCATION	<b>Ph.D. in Neurobiology, Harvard University</b> <i>Brain-wide neural dynamics underlying looming-evoked escapes and spontaneous exploration</i> with Florian Engert	2015
	<b>B.A. in Molecular and Cell Biology, University of California at Berkeley</b> <i>With Highest Honors</i>	2008
HONORS AND AWARDS	Harvard University Certificate of Excellence in Teaching	2016
	A2 Fellowship (international collaboration). Japan National Institute of Genetics.	2015
	National Science Foundation (NSF) Graduate Opportunities Worldwide Fellowship	2013
	Harvard University Certificate of Distinction in Teaching	
	National Science Foundation (NSF) Graduate Research Fellowship	2011
	Molecular and Cell Biology Department Citation (Best in Class). UC Berkeley.	2008
	I.L. Chaikoff Award for Excellence in Undergraduate Research. UC Berkeley.	
	Nathan and Violet David Scholarship (competitive research fellowship). UC Berkeley.	2007
	Regents and Chancellor's Scholarship (full undergraduate funding). UC Berkeley.	2004
RESEARCH EXPERIENCE	<b>Harvard University.</b> Postdoctoral Researcher <i>with Florian Engert</i> <ul style="list-style-type: none"><li>• Built circuit models explaining zebrafish behavior</li><li>• Simulated foraging and exploration to probe state-dependent, spontaneous search strategies</li></ul>	2015 – 2016
	<b>Harvard University.</b> Graduate Researcher <i>with Florian Engert</i> <ul style="list-style-type: none"><li>• Built new software to measure fast animal behaviors with precise environmental control</li><li>• Developed new software to assay these behaviors during two-photon imaging of brain activity</li><li>• Discovered new principles governing neural population encoding of threatening visual stimuli</li><li>• Connected hindbrain nuclei to the statistical generation of spontaneous swimming patterns</li></ul>	2010 – 2015
	While a Visiting Scientist <i>with Misha Ahrens</i> at <b>HHMI Janelia Research Campus</b> : <ul style="list-style-type: none"><li>• Light-sheet imaged pan-neuronal genetically encoded calcium indicators in behaving animals</li><li>• Linked neural activity to behavior using regression-based tools to refine brain-wide data</li></ul>	
	While an international NSF Graduate Fellow <i>with Filippo Del Bene</i> at <b>Institut Curie</b> : <ul style="list-style-type: none"><li>• Measured activity in specific populations of inhibitory interneurons in the zebrafish optic tectum</li></ul>	
	<b>Harvard University.</b> Graduate Researcher <i>with Bruce Bean</i> <ul style="list-style-type: none"><li>• Patch-clamped acutely dissociated neurons to assess serotonin type 3 receptor inactivation</li></ul>	2009
	<b>University of California, Berkeley.</b> Research Specialist <i>with Richard Kramer</i> <ul style="list-style-type: none"><li>• Performed cysteine-scanning mutagenesis to identify binding sites for chemical photoswitches</li></ul>	2008 – 2009
	<b>University of California, Berkeley.</b> Undergraduate <i>with Richard Kramer</i> <ul style="list-style-type: none"><li>• Used electrophysiology and molecular biology to optimize the reactivity of light-switchable ion channel blockers with reactive residues on extracellular domains</li></ul>	2005 – 2008

PUBLICATIONS	<b>Dunn TW</b> and Koo PK (2017). “Inferring Functional Neural Connectivity With Deep Residual Convolutional Networks.” <i>bioRxiv</i>		
	Naumann EA, Fitzgerald JE, <b>Dunn TW</b> , Rihel J, Sompolinsky H, Engert F (2016). “From whole-brain data to functional circuit models: the zebrafish optomotor response.” <i>Cell</i>		
	<b>Dunn TW*</b> , Mu Y*, Narayan S, Randlett O, Naumann EA, Yang C-T, Schier AF, Freeman J, Engert F, Ahrens MB (2016). “Brain-wide mapping of neural activity controlling zebrafish exploratory locomotion.” <i>eLife</i>		
	<b>Dunn TW</b> , Gebhardt C, Naumann EA, Riegler C, Ahrens MB, Engert F, Del Bene F (2016). “Neural circuits underlying visually evoked escapes in larval zebrafish.” <i>Neuron</i>		
	Huang KH, Ahrens MB, <b>Dunn TW</b> , Engert F (2013). “Spinal projection neurons control turning behaviors in zebrafish.” <i>Current Biology</i>		
	Kokel D, <b>Dunn TW</b> , Ahrens MB, Alshut R, Cheung CY, Saint-Amant L, Bruni G, Mateus R, van Ham TJ, Shiraki T, Fukada Y, Kojima D, Yeh JR, Mikut R, von Lintig J, Engert F, Peterson RT (2013). “Identification of nonvisual photomotor response cells in the vertebrate hindbrain.” <i>Journal of Neuroscience</i>		
SELECTED TALKS	Fortin DL, <b>Dunn TW</b> , Fedorchak A, Allen D, Montpetit R, Banghart MR, Trauner D, Adelman JP, Kramer RH (2011). “Optogenetic photochemical control of designer K <sup>+</sup> channels in mammalian neurons.” <i>Journal of Neurophysiology</i>		
	Fortin DL, <b>Dunn TW</b> , Kramer RH (2011). “Engineering light-regulated ion channels.” <i>Cold Spring Harbor Protocols</i>		
	Fortin DL, Banghart MR, <b>Dunn TW</b> , Borges K, Wagenaar DA, Gaudry Q, Karakossian MH, Otis TS, Kristan WB, Trauner D and Kramer RH (2008). “Photochemical control of endogenous ion channels and cellular excitability.” <i>Nature Methods</i>		
	“Snell’s transformation of images in water.” Neurotusany Circuits and Behavior Conference, 2016, Montecastelli Pisano, Italy		
	“Methods for analyzing whole-brain data and behavior.” Humboldt-Universität, 2016, Berlin, Germany		
	“Spontaneous brain rhythms and exploration.” Cold Spring Harbor Laboratory, 2016, Cold Spring Harbor, NY		
TEACHING EXPERIENCE	“Neural control of spontaneous behavior patterns in larval zebrafish.” Computational and Systems Neuroscience Meeting, 2015, Salt Lake City, UT		
	<b>Harvard University.</b>		
	<i>Lecturer.</i> MCB 111: Mathematics in Biology		2017
	<i>Guest Lecturer.</i> NEURO 109A: Precision Neuroscience		2017
	<i>Lecturer.</i> MCB 112: Biological Data Analysis		2016
	<i>Guest Lecturer.</i> OEB 105: Neurobiology of Motor Control		2015
	<i>Teaching Fellow.</i> MCB 105: Systems Neuroscience		2011, 2012, 2013
	<i>Co-Director.</i> Imaging and Behavioral Analysis Workshop		2013
	<b>Japan National Institute of Genetics, Mishima.</b>		
	<i>Course Instructor.</i> Zebrafish Imaging and Transgenesis		2015
	<b>Massachusetts Institute of Technology.</b>		
	Perceptron: An interactive video installation visualizing motion perception. (septmay.org)		2013