DUKE UNIVERSITY MEDICAL CENTER

CURRICULUM VITAE

Name (complete with degrees): Timothy Dunn, PhD

Primary academic appointment: Department of Neurosurgery

Date of birth: July 11,1986   Place: Los Angeles, CA, USA

Citizen of: USA

Education	Institution	Year	Degree
High School	Van Nuys High School, Los Angeles, CA	2004	Diploma
College	University of California, Berkeley	2008	B.A.
Graduate School	Harvard University	2015	Ph.D.

Scholarly societies: Phi Beta Kappa, Golden Key

Professional training and academic career:

Institution	Position/Title	Dates
UC Berkeley, Kramer Lab	Undergraduate Researcher	2004-2008
UC Berkeley, Kramer Lab	Research Scientist	2008-2009
Harvard Medical School, Bean Lab	Graduate Rotation Student	2009
Harvard University, Engert Lab	Graduate Student Researcher	2009-2015
Institut Curie, Del Bene Lab	NSF GROW Fellow	2013
HHMI Janelia Research Campus	Visiting Scientist	2013-2016
Harvard University, Engert Lab	Postdoctoral Associate	2015-2016
Harvard University	College Fellow of MCB	2016-2017
Duke University	Duke Forge / AI Health Postdoctoral Fellow	2017-2020
Duke University	Assistant Professor of Neurosurgery	Aug 1, 2020 --

Publications:

Refereed journal and archival conference papers:

1. Fortin DL, Banghart MR, **Dunn TW**, Borges K, Wagenaar DA, Gaudry Q, Karakossian MH, Otis TS, Kristan WB, Trauner D, Kramer RH (2008). "Photochemical control of endogenous ion channels and cellular excitability." *Nature Methods.*
2. Fortin DL, **Dunn TW**, Fedorchak A, Allen D, Montpetit R, Banghart MR, Trauner D, Adelman JP, Kramer RH (2011). "Optogenetic photochemical control of designer K+ channels in mammalian neurons." *Journal of Neurophysiology.*
3. Kokel D, **Dunn TW**, 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." *Journal of Neuroscience.*
4. Huang KH, Ahrens MB, **Dunn TW**, Engert F (2013). "Spinal projection neurons control turning behaviors in zebrafish." *Current Biology.*
5. **Dunn TW**, Gebhardt C, Naumann EA, Riegler C, Ahrens MB, Engert F, Del Bene F (2016). "Neural circuits underlying visually evoked escapes in larval zebrafish." *Neuron.*
6. **Dunn TW***, Mu Y*, Narayan S, Randlett O, Naumann EA, Yang C-T, Schier AF, Freeman J, Engert F, Ahrens MA (2016). "Brain-wide mapping of neural activity controlling zebrafish exploratory locomotion." *eLife.*
7. Naumann EA, Fitzgerald JE, **Dunn TW**, Rihel J, Sompolinsky H, Engert F (2016). "From whole-brain data to functional circuit models: the zebrafish optomotor response." *Cell.*
8. Harfouche M, **Dunn TW**, Naumann EA, Horstmeyer R (2019). "Imaging the behavior and neural activity of freely moving organisms with a gigapixel microscope." *Biophotonics Congress: Optics in the Life Sciences Congress*.
9. **Dunn TW** and Fitzgerald JE (2020). "Correcting for physical distortions in visual stimuli improves reproducibility in zebrafish neuroscience." *eLife.*
10. Elahi C, Spears CA, Williams S, **Dunn TW**, Najjuma JN, Staton CA, Vissoci JR, Fuller A, Kitya D, Haglund MM (2020). "An attitude survey and assessment of the feasibility, acceptability, and usability of a traumatic brain injury decision support tool in Uganda." *World Neurosurgery.*
11. Koltai DC, **Dunn TW**, Smith P, Sinha DD, Bobholz S, Kaddumukasa MN, Teuwen DE, Nakasujja Noeline, Chrakraborty P, Kolls BJ, Nakku J, Haglund MM, Fuller A (2020). "Sociocultural determinants and patterns of healthcare utilization for epilepsy care in Uganda." *Epilepsy and Behavior.*
12. Marshall J, Aldarondo D, **Dunn TW**, Wang W, Berman G, Olveczky O (2020). "Continuous long-term recordings of whole-body kinematics across the rodent behavioral repertoire." *Neuron.*
13. Adil SM, Elahi C, Gramer R, Spears CA, Fuller AT, Haglund MM, **Dunn TW** (2020). "Predicting the

impact of neurosurgery on TBI patients in the low resource setting: A Machine Learning Approach in Uganda." *Journal of Neurotrauma.*

14. Spears CA, Adil SM, Fuller A, Kolls BJ, Haglund MM, **Dunn TW** (2020). "Surgical intervention and patient factors associated with acute outcomes in patients with traumatic brain injury at a tertiary care hospital in Uganda." *Journal of Neurosurgery (In press).*
15. Zhang L, **Dunn TW**, Marshall J, Ölveczky BP, Linderman S. "3D animal pose estimation with a hierarchical von Mises-Fisher-Gaussian model." *Artificial Intelligence and Statistics (AISTATS) 2021 (In press).*
16. **Dunn TW***, Marshall J*, Severson S, Aldarondo D, Hildebrand D, Chettih SN, Wang WL, Gellis AJ, Carlson DE, Aronov D, Freiwald W, Wang F, Ölveczky BP (2021). "Geometric deep learning enables 3D kinematic profiling across species and environments." *Nature Methods (In press).*
17. Yao X, Xi H, Zhou K, **Dunn TW**, Horstmeyer R. "Increasing a microscope's effective field of view via overlapped imaging and deep learning classification." *Quantitative Imaging in Medicine and Surgery (In revision).*
18. Adil SM, Elahi C, Patel D, Seas A, Fuller AT, Haglund MM, **Dunn TW**. "Deep Learning to Predict Traumatic Brain Injury Outcomes in the Low-Resource Setting." *Journal of neurotrauma (under review).*

Non-refereed publications:

1. **Dunn TW** (2015)**. "**Brain-wide neural dynamics underlying looming-evoked escapes and spontaneous exploration." *Harvard University PhD Dissertation.*
2. **Dunn TW** and Koo PK (2017). "Inferring functional neural connectivity with deep residual convolutional networks." *bioRxiv.*
3. Carin L, Carlson D, **Dunn TW**. Introduction to Machine Learning, Duke University Coursera Course (first released 2018). Accessed from https://www.coursera.org/learn/machine-learning-duke.

Chapters in books:

1. Fortin DL, **Dunn TW**, Kramer RH (2011). "Engineering light-regulated ion channels." Cold Spring Harbor Protocols

Competitive refereed conference submissions (reputable venues for computational neuroscience and machine learning):

1. **Dunn TW***, Mu Y*, Narayan S, Yang C-T, Freeman J, Engert F, Ahrens MA (2015). "Neural control of spontaneous behavior patterns in larval zebrafish." *Computational and Systems Neuroscience* (*Cosyne*) 2015 (Oral)
2. **Dunn TW***, Marshall J*, Wang W, Carlson D, Ölveczky BP (2019). "Quantifying 3D body and limb kinematics as a prerequisite for understanding behavior." *Learning a Meaningful Representation of Life (LMRL) Workshop, Neural Information Processing Systems (NeurIPS).*
3. Marshall J, Aldarondo D, Wang W, **Dunn TW**, Berman G, Ölveczky BP (2020). "Probing the neural substrates of movement across the rodent behavioral repertoire." *Computational and Systems Neuroscience* (*Cosyne*) 2020.
4. Zhang L, **Dunn TW**, Marshall J, Ölveczky BP, Linderman S (2021). "3D animal pose estimation with a hierarchical von Mises-Fisher-Gaussian model." *Computational and Systems Neuroscience* (*Cosyne*) 2021.
5. **Dunn TW***, Marshall J*, Severson S, Aldarondo D, Hildebrand D, Chettih SN, Wang WL, Gellis AJ, Carlson DE, Aronov D, Freiwald W, Wang F, Ölveczky BP (2021). "Geometric learning enables 3D kinematic profiling across species and environments." *Computational and Systems Neuroscience* (*Cosyne*) 2021.
6. Marshall J, Aldarondo DE, Wang WL, Gellis A, Ölveczky BP, **Dunn TW** (2021). "Quantitative deconstruction of behavioral ontogeny." *Computational and Systems Neuroscience* (*Cosyne*) 2021.

Non-authored publications: (Faculty member formally acknowledged in the publication for his/her contributions.)

1.	Oteiza P, Odstrcil I, Lauder G, Portugues R, Engert F (2017). "A novel mechanism for mechanosensory-based rheotaxis in larval zebrafish." *Nature*.
2.	Koo PK, Eddy SR (2019). "Representation learning of genomic sequence motifs with convolutional neural networks." *PLoS Computational Biology.*
3.	Loring MD, Thomson EE, Naumann EA (2020). "Whole-brain interactions underlying zebrafish behavior." *Current Opinion in Neurobiology.*

<u>Selected abstracts and other conference papers:</u>

1. **Dunn TW**, Ahrens MA, Orger MB, Robson DN, Li J, Schier AF, Engert F (2012). "Mapping a circuit underlying visually evoked escape behavior in larval zebrafish." *Society for Neuroscience Annual Meeting*
2. **Dunn TW**, Mu Y, Narayan S, Naumann EA, Yang C-T, Randlett O, Schier AF, Freeman J, Engert F, Ahrens MA (2014). "A neural basis for the modulation of spontaneous behavior in larval zebrafish." *79th Cold Spring Harbor Symposium: Cognition*
3. Naumann EA, Fitzgerald JE, **Dunn TW**, Engert F (2016). "Quantifying individual behavior signatures in larval zebrafish." *Society for Neuroscience Annual Meeting*.
4. Fitzgerald JE, Naumann EA, **Dunn TW**, Engert F, Lee DD, Sompolinsky H (2018). "Predicting task-relevant and task-irrelevant pretectal activity." *8th Strategic Conference for Zebrafish Investigators*.
5. Schroeder R, Neely B, **Dunn TW**, Frasure E, Huang E, Mathew J (2019). "Use of neural net modeling for drug diversion surveillance among anesthesiology providers." *American Society of Anesthesiologists*
6. Marshall JD, Aldarondo DE, **Dunn TW**, Wang W, Berman G, Olveczky O (2019). "Continuous recordings of whole-body kinematics across the rodent behavioral repertoire." *Society for Neuroscience Annual Meeting.*
7. Adil SM, Elahi C, Gramer R, Spears CA, Fuller AT, Haglund MM, **Dunn TW** (2020). *"*Predicting the Impact of Neurosurgery on TBI Patients in the Low-Resource Setting: A Machine Learning Approach in Uganda.*" Congress of Neurological Surgeons.*
8. Elahi C, Adil SM, Fuller AT, Vissoci J, Staton C, Haglund MM, **Dunn TW** (2020). "A decision curve analysis to compare multiple TBI models and estimate their clinical impact." *Congress of Neurological Surgeons.*
9. Adil SM, Elahi C, Fuller AT, Haglund MM, **Dunn TW** (2020). "Deep Learning to Predict TBI Outcomes in the Low Resource Setting." *Congress of Neurological Surgeons.*

Consultant appointments:
1. Ramona Optics (2017)

Professional awards and special recognitions:

1. Valedictorian, Van Nuys High School (2004)
2. Regents and Chancellor's Scholarship (full undergraduate funding), UC Berkeley (2004)
3. I.L. Chaikoff Award for Excellence in Undergraduate Research, UC Berkeley (2007)
4. Molecular and Cell Biology Department Citation (Best In Class), UC Berkeley (2008)
5. National Science Foundation Graduate Research Fellowship (2011)
6. National Science Foundation Graduate Opportunities Worldwide Fellowship (2013)
7. Harvard University Certificate of Distinction in Teaching (2013)
8. A2 Fellowship (competitive international collaboration funding), Japan NIG (2015)
9. Harvard University Certificate of Excellence in Teaching (2017)
10. IBM Watson AI XPRIZE Finalist (with Team DataKind) (2017)
11. NVIDIA GPU Grant (2017)
12. Pratt School of Engineering Peer Recognition (2020)
13. Duke Global Health Institute Pilot Research Pilot Grant (2020)
14. Duke Institute for Health Innovation Pilot Grant (2020)
15. Duke Institute for Brain Sciences Incubator Grant (2020)
16. Finalist, McKnight Technological Innovations in Neuroscience Award (2021)

Organizations and participation:

1. Member, Society for Neuroscience
2. Reviewer, iScience
3. Reviewer, AAAI Conference on Artificial Intelligence
4. Reviewer, Duke MEDx
5. Content Creator, Duke Center for Computational Thinking

Teaching responsibilities (lecturer or course organizer):

1. Harvard Imaging and Behavior Analysis Workshop (2013)
2. Harvard OEB 105: Neurobiology of Motor Control (2015)
3. Harvard NEURO 109A: Precision Neuroscience (2017)
4. Harvard MCB 112: Biological Data Analysis (2017)
5. Harvard MCB 111: Mathematics in Biology (2017)
6. Duke NUS +DS Machine Learning School (Singapore) (2019-2020)
7. Duke Machine Learning Summer School, Winter School, Coursera, +DS (2018-2020)
8. Duke EGR 190/590: AI for Everyone (2020)

Areas of research interests:
- Computer Vision
- Machine Learning
- Computational Neuroscience
- Brain Imaging
- Traumatic Brain Injury
- Statistics
- Animal Behavior
- Motor Systems
- Neurodegenerative Disease
- Global Health

External support - gifts, grants, and contracts:

	PI	Approx. % Effort	Purpose	Approx. Amount	Duration
Past:	Eva Naumann	5	Salary	NIH SBIR, $11K	2018-2020
	Florian Engert	50	Salary	NIH R01, $150K	2014-2016
	Timothy Dunn	100	Salary	NSF GRFP, $120K	2011-2014
Present:	Timothy Dunn		Research Costs	DIHI RFP, $70K	2020-2021
	Timothy Dunn/ Anthony Fuller/ Michael Haglund		Research Costs	DGHI, $25K	2020-2021
	Michael Haglund		Research Costs	Donna Bernstein, $150K	2020-2021
	Timothy Dunn/ Michael Tadross		Research Costs	DIBS Incubator, $100K	2020-2021
Pending:	Bence Olveczky/ Timothy Dunn (sub-award)	50	Salaries, Equip.	NIH R01, $1M	2021-2026