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ALISON I WEBER

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EDUCATION

University of Washington
Seattle, WA
Neuroscience, Ph.D.
Certificate in Neural Computation & Engineering
March 2019

University of Chicago
Chicago, IL
Biological Sciences, B.A.
Minor in Computational Neuroscience
June 2011

RESEARCH

Assistant Professor
Bryn Mawr College
Aug 2023 - present

Research areas:
mechanosensory encoding in insect wings
efficient & robust sensing strategies
interaction of neural encoding, body structure, & behavior

Washington Research Foundation Postdoctoral Fellow / UW Data Science Postdoctoral Fellow
University of Washington
Oct 2019 - Jul 2023

Advisors:
Tom Daniel, Dept. of Biology
Bing Brunton, Dept. of Biology

Doctoral Candidate
University of Washington
Sep 2012 - Mar 2019

Advisors:
Fred Rieke, Dept. of Physiology & Biophysics
Eric Shea-Brown, Dept. of Applied Mathematics

Research Assistant
University of Chicago
Jun 2009 - Dec 2011

Advisor:
Sliman Bensmaia, Dept. of Organismal Biology & Anatomy

TEACHING

Instructor, Sensory Physiology (original course)
Bryn Mawr College
Spring 2024, 2025; Fall 2025

Instructor, Senior Seminar in Science & Society
Bryn Mawr College
Spring 2024

Instructor, Computational Methods in the Sciences (original course)
Bryn Mawr College
Fall 2023, 2024

Instructor, Neural Coding (original course)
Bryn Mawr College
Fall 2024

Co-Instructor, Controlling the Brain: Scientific, Therapeutic, & Ethical Implications of New Neurotechnologies (original course)

University of Washington Bothell
Spring 2022

Guest Lecturer, Neurobiology
University of Washington
Winter 2021

Co-Instructor, Introduction to Brains & Neuroscience
University of Washington
Spring 2020

Instructor, Readings in Neurobiology: Linking Single Neurons to Perception & Behavior (original course)
University of Washington
Spring 2016

PUBLICATIONS

1. Stanchak KE, Deora T, **Weber, AI**, Hickner, MK, Moalin A, Abdalla L., Daniel TL, & Brunton BW. (2024) Intraspecific variation in the placement of campaniform sensilla on the wings of the hawkmoth *Manduca sexta*. *Integr Org Biol*, 6(1), obae007.

2. **Weber AI***, Babaei M*, Mamo A, Brunton BW, Daniel T, & Bergbreiter S. (2023) Nonuniform structural properties of wings confer sensing advantages. *J R Soc Interface* 20(200), 20220765.

3. Kubicek R, Babaei M, **Weber AI**, & Bergbreiter S. (2023) A New Sensation: Digital Strain Sensing for Disturbance Detection In Flapping Wing Micro Aerial Vehicles. International Conference on Robotics and Automation. (peer-reviewed conference paper)

4. **Weber AI**, Daniel TL, & Brunton BW. (2021) Wing structure and neural encoding jointly determine sensing strategies in insect flight. *PLOS Comput Biol* 17(8): e1009195.
   Code available: github.com/aiweber/optimal_sensing_ELwing

5. Aiello BR*, Stanchak KE*, **Weber AI***, Deora T, Sponberg S, & Brunton BW. (2021) Spatial distribution of campaniform sensilla mechanosensors on wings: Form, function, and phylogeny. *Curr Opin Insect Sci* 48: 8-17.

6. **Weber AI**, Shea-Brown E*, & Rieke F*. (2021) Identification of multiple noise sources improves estimation of neural responses across stimulus conditions. *eNeuro* 8(4).
   Code available: github.com/aiweber/Multistage_noise_model

7. **Weber AI** & Fairhall A. (2019) The role of adaptation in neural coding. *Curr Opin Neurobiol* 58: 135-140.

8. **Weber AI***, Krishnamurthy K*, & Fairhall A. (2019) Coding principles in adaptation. *Annu Rev Vis Sci* 5: 427-449.

9. Saal HP, Suresh AK, Solorzano LE, **Weber AI**, & Bensmaia SJ. (2018) The effect of contact force on the responses of tactile nerve fibers to scanned textures. *Neuroscience* 389: 99-103.

10. **Weber AI** & Pillow JW. (2017) Capturing the dynamical repertoire of single neurons with generalized linear models. *Neural Comput* 29(12): 3260-3289.
    Code available: github.com/aiweber/GLM_and_Izhikevich

11. Lieber JD, Xia X, **Weber AI**, & Bensmaia SJ. (2017) The neural code for tactile roughness in the somatosensory nerves. *J Neurophysiol* 118(6):3107-3117.

12. Brinkman BAW*, **Weber AI***, Rieke F$^{\diamond}$, & Shea-Brown E$^{\diamond}$. (2016) How do efficient coding strategies depend on origins of noise in neural circuits? *PLOS Comput Biol* 12(10): e1005150.

13. **Weber AI***, Saal HP*, Cheng JW, Lieber JD, Manfredi LR, Dammann JF, & Bensmaia SJ. (2013) Spatial and temporal codes mediate the tactile perception of natural textures. *PNAS* 110(42): 17107-12.

14. Cheng JW, **Weber AI**, & Bensmaia SJ. (2013) Comparing the effects of isoflurane and pentobarbital on the responses of cutaneous mechanoreceptive afferents. *BMC Anesthesiol* 13: 10.

15. Yau JM, **Weber AI**, & Bensmaia SJ. (2010) Separate mechanisms for audio-tactile pitch and loudness interactions. *Front Psychology* 1: 160.

*◇ Equal contributions

PATENTS

Application Pending

1. Strain Sensor Switch for Timing Based Sensing. Co-inventors: Kubicek R, Bergbreiter S, Babaei M, **Weber AI**, Kim S, & Daniel T. Application: 18/735,123

PRESENTATIONS

Invited Talks

1. Sparse and efficient sensing in flight: Lessons from insect wings. (2023, December) Department of Mechanical Engineering, Villanova University.

2. Wing structure and neural encoding jointly determine sensing strategies in insect flight. (2023, March) Air Force Office of Scientific Research Workshop: Bio-Inspired Sensing, Computing, and Control with International Teams (BISCCITs), Washington, D.C.

3. Sensing in flight: neural encoding and wing structure interact to shape sensory information. (2022, May) Neural Computation & Engineering Connection, University of Washington.

4. Identifying the library of features encoded during insect flight. (2021, November) Be Boundless Seminar, Graduate Program in Neuroscience, University of Washington.

Tutorials

1. A Practical Introduction to Information Theory. (2025, June) Air Force Office of Scientific Research Workshop: Bio-Inspired Sensing, Computing, and Control with International Teams (BISCCITs), Boulder, CO.

2. Exploiting Sparsity: Compressed Sensing and Beyond. (2023, March) Air Force Office of Scientific Research Workshop: Bio-Inspired Sensing, Computing, and Control with International Teams (BISCCITs), Washington, D.C.

3. Sensing in Insect Flight. (2022, April) Cambridge Neurotech Techniques Webinar Series, virtual.

Contributed Talks

1. Wang C, **Weber AI**, von Hagel AA, Wolf L, Brunton BW, & Daniel TL. (2024, January) Insect wing mechanosensory neurons encode rapid bending across a range of wingbeat phases. Society for Integrative & Comparative Biology Annual Meeting, Seattle, WA.

2. Deora T, Torres M, **Weber A**, Brunton B, & Daniel T. (2024, January) Pilifers provide proprioceptive feedback about mouthpart movement in hawkmoths, *Manduca sexta*. Society for Integrative & Comparative Biology Annual Meeting, Seattle, WA.

3. **Weber AI**, von Hagel AA, Wolf L, Daniel TL, & Brunton BW. (2022, January) Identifying neural response properties of wing mechanosensors requires reconstruction of spatiotemporal strain. Society for Integrative & Comparative Biology Annual Meeting, Phoenix, AZ.

4. Babaei M, **Weber AI**, Daniel TL, & Bergbreiter S. (2022, January) Nonuniform stiffness of insect wings enhances sensing performance. Society for Integrative & Comparative Biology Annual Meeting, Phoenix, AZ.

5. Stanchak KE, Deora T, Aiello BR, **Weber AI**, Moalin A, Sponberg S, & Brunton BW. (2022, January) Comparing the distribution of campaniform sensilla across insect wings to understand the functional consequences of sensor placement. Society for Integrative & Comparative Biology Annual Meeting, Phoenix, AZ.

6. **Weber AI**, Daniel TL, & Brunton BW. (2021, January) Neural encoding and structural properties interact to determine optimal placement of sparse, spiking sensors on an insect wing. Society for Integrative & Comparative Biology Annual Meeting, Washington, DC (Virtual).

7. Mamo AH, **Weber AI**, Mohren TL, Babaei M, & Daniel TL. (2021, January) Finite element analyses of flapping wings meets inertial sensing. Society for Integrative & Comparative Biology Annual Meeting, Washington, DC (Virtual).

8. Saal HP, Lieber JD, **Weber AI**, & Bensmaia SJ. (2014, February) Both spatial and temporal codes shape texture perception. Cosyne, Salt Lake City, UT.

9. **Weber AI**, Cheng JW, Dammann JF, & Bensmaia SJ. (2011, November) The coding of natural textures at the somatosensory periphery. Functional Properties and Neural Coding Nanosymposium, Society for Neuroscience Annual Meeting, Washington, DC.

Poster Presentations

1. Wang Z, **Weber A**, von Hagel A, Babaei M, Brunton B, Bergbreiter S, & Daniel T. (2023, January) Sense and extensibility: two dimensions of stimulus features for wing strain improve sparse sensing. Society for Integrative & Comparative Biology Annual Meeting, Austin, TX.

2. **Weber AI**, von Hagel AA, Daniel TL, & Brunton BW. (2022, March) Multiple stimulus features are encoded by single mechanosensory neurons in insect wings. Computational & Systems Neuroscience (COSYNE), Lisbon, Portugal.

3. **Weber AI**, von Hagel AA, Wolf L, Brunton BW, & Daniel TL. (2022, January) Individual wing mechanosensors exhibit selectivity to multiple stimulus features. Society for Integrative & Comparative Biology Annual Meeting, Phoenix, AZ.

4. Fore M, McLachlan R, Bonnin E, **Weber A**, & Grear M. (2018, February) Graduate students closing the gap in science communication training. American Association for the Advancement of Science (AAAS) Annual Meeting, Austin, TX.

5. **Weber AI**, Shea-Brown E$^{\diamond}$, & Rieke F$^{\diamond}$. (2017, November) Disentangling multiple sources of variability in the responses of retinal ganglion cells. Society for Neuroscience Annual Meeting, Washington, DC.

6. **Weber AI**, Rieke F$^{\diamond}$, & Shea-Brown E$^{\diamond}$. (2016, February) Disentangling the contributions of multiple noise sources to neuronal variability. Computational & Systems Neuroscience (COSYNE), Salt Lake City, UT.

7. Delhaye BP, **Weber AI**, & Bensmaia SJ. (2016, November) Decoding motion speed from the responses of tactile afferents. Society for Neuroscience Annual Meeting, San Diego, CA.

8. Lieber JD, Saal HP, Boundy-Singer ZM, **Weber AI**, & Bensmaia SJ. (2016, November) The coding of natural textures in primate somatosensory cortex. Society for Neuroscience Annual Meeting, San Diego, CA.

9. Lieber JD, Saal HP, Boundy-Singer ZM, **Weber AI**, Winberry JE, & Bensmaia SJ. (2016, November) The transformation of texture representations from somatosensory periphery to cortex. Society for Neuroscience Annual Meeting, San Diego, CA.
10. Saal HP, Lieber JD, Boundy-Singer ZM, **Weber AI**, & Bensmaia SJ. (2016, November) Tactile texture invariance and its peripheral neural basis. Society for Neuroscience Annual Meeting, San Diego, CA.
11. Saal HP, Lieber JD, Boundy-Singer ZM, **Weber AI**, & Bensmaia SJ. (2015, November) Inferring the neural representations underlying perceptual invariance in touch. Society for Neuroscience Annual Meeting, Chicago, IL.
12. Brinkman BAW*, **Weber AI***, Rieke F$^{\diamond}$, & Shea-Brown E$^{\diamond}$. (2015, March) Multiple noise sources shape optimal encoding strategies in fundamentally different ways. Computational & Systems Neuroscience (COSYNE), Salt Lake City, UT.
13. Brinkman BAW, **Weber AI**, Rieke F$^{\diamond}$, & Shea-Brown E$^{\diamond}$. (2014, July) Noise- and stimulus-dependence of the optimal encoding nonlinearities in a simple ON/OFF retinal circuit model. Annual Computational Neuroscience Meeting (CNS), Quebec City, Canada.
14. Saal HP, Lieber JD, Manfredi LR, **Weber AI**, Dammann JF, & Bensmaia SJ. (2013, November) The influence of fingerprint skin on texture perception. Society for Neuroscience Annual Meeting, San Diego, CA.
15. Lieber JD, **Weber AI**, Saal HP, & Bensmaia SJ. (2013, November) The peripheral neural code of tactile roughness for natural textures. Society for Neuroscience Annual Meeting, San Diego, CA.
16. Harvey MA, **Weber AI**, Best MD, & Bensmaia SJ. (2011, November) Spectro-temporal receptive field properties of neurons in primate somatosensory cortex. Society for Neuroscience Annual Meeting, Washington, DC.

*$^{\diamond}$ Equal contributions

MENTORSHIP

Undergraduate thesis supervision
Sinthia Ahammed, Neuroscience ’26
Madeline Nobert, Biology ’26
Ksenia Mats*, Biology ’26
Lillian Belzer, Neuroscience ’25

Other research supervision
Reese Jennings, Neuroscience ’27
Faizah Shaik, Neuroscience ’27
Tabia Tahsin, Neuroscience ’27
Asal Mogharehdehkordy, Biology ’27
Cynthia Clark, Neuroscience ’26
Mars Torres*, Post-baccalaureate Research Assistant, Univ. of Washington
Aman Mamo*, MS Materials Science & Engineering ’21, Univ. of Washington
Christina Wang*, Psychology & Mathematics ’21, Univ. of Washington
Abby von Hagel*, Post-baccalaureate Research Assistant, Univ. of Washington

Off-campus thesis supervision
Mahnoor Nasir*, Neuroscience ’26
Shriya Shivakumar*, Biology ’25
Amelia McIver*, Biology ’24

* Co-advised

FELLOWSHIPS, AWARDS, & HONORS

2025 - 2028	NSF Building Research Capacity of New Faculty in Biology (BRC-BIO). Award 2437471. *Neural mechanisms underlying stable flight in insects*.
2025	Brainstorming Grant: Computational Neuroscience Interest Group. Mellon Tri-College Faculty Forum
2020 - 2023	UW Data Science Postdoctoral Fellow, eScience Institute, Univ. of Washington
2019 - 2023	Washington Research Foundation Postdoctoral Fellow
2013 - 2018	NSF Graduate Research Fellow (GRFP), Mathematical Sciences
2012 - 2015	Achievement Rewards for College Scientists (ARCS) Fellow
2010 - 2011	Student Marshal, Univ. of Chicago
2010	Phi Beta Kappa
2009 - 2011	Undergraduate Fellow in Neuroscience & Neuroengineering, Univ. of Chicago
2009	Summer Program for Undergraduates in Neuroscience & Neuroengineering, Univ. of Chicago
2007 - 2011	University Scholar (academic scholarship), Univ. of Chicago

ADDITIONAL TRAINING

Science Teaching Experience Program, Spring 2022
University of Washington, Seattle, WA
Mentored apprenticeship to learn inclusive, evidence-based, student-centered pedagogies

Communicating Science to the Public Effectively, Winter 2017
University of Washington, Seattle, WA
Quarter-long course culminating in a public lecture at Town Hall Seattle
Video: https://www.youtube.com/watch?v=NXXjUXKUR6w&t=115s

Methods in Computational Neuroscience, Summer 2014
Marine Biological Laboratory, Woods Hole, MA
Summer course including an individual research project [10]

SERVICE & OUTREACH

2024 - 2026	Computational & Systems Neuroscience (COSYNE) Program Committee
Nov 2022 - Jun 2023	Weill Neurohub / Allen Institute Post-Baccalaureate Mentorship Program, Co-Organizer, Univ. of Washington
Aug 2022 - Jul 2023	Computational Neuroscience Center Seminar Committee, Univ. of Washington
Oct 2020 - Feb 2023	Graduate Program in Neuroscience Admissions Committee, Univ. of Washington
Apr 2017 - Jul 2018	Board of Directors, UW Engage, Univ. of Washington
Dec 2016 - Jun 2018	Lead Graduate Student Editor for *Grey Matters*, Univ. of Washington
Oct 2016 - Apr 2018	Tutor for Y-Scholars Program, Garfield High School, Seattle, WA
Oct 2017	Science at the Market Volunteer, Seattle, WA
Jan - Mar 2017	Individual Mentor for Bio Expo, Mercer Island High School, Seattle, WA
2013, 2014, 2016	Co-Instructor for Summer BRIDGE Program for Incoming Freshmen, Univ. of Washington
Sep 2012 - Nov 2016	Volunteer, Neuroscience Community Outreach Group, Univ. of Washington
Peer review:	*Biology Letters*, Computational & Systems Neuroscience (COSYNE) Conference, *Current Biology, iScience, Neuron, Proceedings of the National Academy of Sciences, Proceedings of the Royal Society B*