

Jacob M. Graving

Max Planck Institute of Animal Behavior
University of Konstanz
Department of Collective Behaviour
Centre for the Advanced Study of Collective Behaviour
Universitätsstr. 10
Konstanz, Germany 78464

✉ jgraving@gmail.com
☎ +49 176 20710858
🌐 jakegraving.com
🐦 twitter.com/jgraving
🔗 github.com/jgraving

Education

- 2020 (expected) **Ph.D., Biology**
Department of Collective Behaviour, Max Planck Institute of Animal Behavior
Chair of Biodiversity and Collective Behaviour, University of Konstanz
Centre for the Advanced Study of Collective Behaviour, University of Konstanz
International Max Planck Research School (IMPRS) for Organismal Biology
- 2015 **M.S., Biology**
Department of Biological Sciences, Bowling Green State University
- 2013 **B.S., Biology**
Department of Biological Sciences, Bowling Green State University

Publications

- In Preparation **Graving, J.M.**, Couzin, I.D. A deep generative model for dimensionality reduction.
- In Review Li, L., Nagy, M., **Graving, J.M.**, Bak-Coleman, J., Guangming X., Couzin, I.D. Schooling fish save energy by vortex-phase matching. In review
- 2019 **Graving, J.M.**, Chae, D., Naik, H., Li, L., Koger, B., Costelloe, B.R., Couzin, I.D. (2019). DeepPoseKit, a software toolkit for fast and robust animal pose estimation using deep learning. eLife, 8. <https://doi.org/10.7554/elife.47994> bioRxiv: <https://doi.org/10.1101/620245> Code: <https://github.com/jgraving/deepposekit> Press: Quanta Magazine, Nature Methods, Nature News & Views, eLife Science Digests
- 2018 Alarcón-Nieto, G.*, **Graving, J.M.***, Klarevas-Irby, J.A.*, Maldonado-Chaparro, A.A., Mueller, I., and Farine, D.R. (2018) An automated barcode tracking system for behavioural studies in birds. Methods in Ecology and Evolution 9 (6), 1536-1547. <https://doi.org/10.1111/2041-210X.13005> bioRxiv: <https://doi.org/10.1101/201590> *contributed equally
- 2017 **Graving, J.M.**, Bingman, V.P., Hebets, E.A., and Wiegmann, D.D. (2017). Development of site fidelity in the nocturnal amblypygid *Phrynos marginemaculatus*. Journal of Comparative Physiology A, 203(5), 313-328. <https://doi.org/10.1007/s00359-017-1169-5>
- 2017 Bingman, V.P., **Graving, J.M.**, Hebets, E.A., and Wiegmann, D.D. (2017). Importance of the antenniform legs, but not vision, for homing by the neotropical whip spider *Paraphrynos laevis*. Journal of Experimental Biology, 220(5), 885-890. <https://doi.org/10.1242/jeb.149823> Press: Discover Magazine, National Geographic
- 2016 Wiegmann, D.D., Hebets, E.A., Gronenberg, W., **Graving, J.M.**, and Bingman, V.P. (2016). Amblypygids: model organisms for the study of arthropod navigation mechanisms in complex environments. Frontiers in Behavioral Neuroscience, 10, 47. <https://doi.org/10.3389/fnbeh.2016.00047>

Research

- 2015–2019 **Max Planck Institute of Animal Behavior,**
Department of Collective Behaviour
University of Konstanz, Chair of Biodiversity and Collective Behaviour
Iain D. Couzin
“Revealing the Behavioral Algorithms of Social Animals”

Studying how sensory information and internal state drive the collective dynamics of animal groups.

- 2011–2015 **Bowling Green State University, Department of Biological Sciences**
Daniel D. Wiegmann, Verner P. Bingman
“Navigation and Sensory Discrimination in Amblypygids”
Studied how amblypygids, a group of nocturnal arachnids, navigate home in the dark.
- 2013 **Bowling Green State University, Department of Biological Sciences**
Sheryl L. Coombs
“The Sensory Basis of Rheotaxis in Fish”
Studied how fish use multimodal sensory information to orient to flow.
- 2009 **SETGO Summer Research Scholar, Bowling Green State University**
Matthew L. Partin
“Phenotypic Plasticity in Photosynthetic Stony Corals”
Studied how genetically identical coral propagules adapt their morphology and physiology to changing environments.

Teaching

- 2019 **ASAB 2019 Summer Conference, University of Konstanz**
Workshop Organizer and Lecturer
– Seminar on “Machine Learning in the Behavioral Sciences”
– Practical Workshop on “Quantifying Behavior with Machine Learning”
- 2016–now **University of Konstanz, Chair of Biodiversity and Collective Behaviour**
Lecturer and Project Advisor, Intensive Research Course for Master’s Students
– Measuring Animal Behavior with Computer Vision
– Analyzing Behavioral Data
– Introduction to Programming
- 2013–2015 **Department of Biological Sciences, Bowling Green State University**
Graduate Assistant
– Advanced Biostatistics (for Graduate Students)
– Introduction to Biostatistics
– Population and Community Ecology
– Introductory Biology for Non-Science Majors
– Guest Lecture on “Arthropod Navigation”, Animal Behavior
- 2009–2012 **Bowling Green State University, Department of Biological Sciences**
Student Coordinator and Teaching Assistant, Marine Biology Laboratory
– Introduction to Inland Marine Research
– Aquarium Husbandry
– Reef Aquarium Husbandry I and II
- 2009 **Bowling Green State University, Department of Environmental Science**
Student Teaching Assistant, Introduction to Environmental Science

Funding

- 2013–2015 **Graduate Research Fellowship**
100% Tuition Waiver and \$45,000 Stipend
Bowling Green State University
- 2013 **Undergraduate Research Fellowship**
\$5000 Stipend, \$800 Research Funds
Bowling Green State University, Center for Undergraduate Research and Scholarship
- 2009–2011 **T. Richard Fisher Biology Scholarship**
\$8000/year Tuition Scholarship

Bowling Green State University, Department of Biological Sciences

2009

Summer Research Fellowship

\$5000 Stipend, \$1000 Research Funds

Science, Engineering, Technology Gateway Ohio (SETGO), National Science Foundation

2009–2013

Award of Scholars

Merit-based 75% Tuition Scholarship

Bowling Green State University, College of Arts and Sciences

Invited Talks

2019

Revealing the Behavioral Algorithms of Social Animals

Princeton Neuroscience Institute (PNI)

Princeton University

Princeton, New Jersey, USA

2018

Perception and Motion in Locust Swarms

Integrated Behavioral Research Group (IBRG)

Princeton University

Princeton, New Jersey, USA

Perception and Motion in Locust Swarms

Department of Biological Sciences Seminar Series

Bowling Green State University

Bowling Green, Ohio, USA

Outreach

2017

Konstanzer Lange Nacht Der Wissenschaft

“Long Night of Science” Public Outreach Event

Volunteer

Konstanz, Germany

2016

Das Schwarmverhalten der Fische

Public Seminar by Prof. Jens Krause

Volunteer Co-organizer

Konstanz, Germany

2013–2014

Kid’s Tech University, Bowling Green State University

Public Outreach Event for Schoolchildren Grades K–8

Volunteer

Bowling Green, Ohio, USA

2008–2010

The Toledo Zoo Aquarium

Volunteer and Intern

Toledo, Ohio, USA

Advisees

Graduate

Simon Gommel, M.S. Biology, University of Konstanz

Taylor Carter, M.S. Biology, University of Konstanz

Ingabritta Hormann, M.S. Biology, University of Konstanz

Undergraduate

Nicole Meister, B.S. Computer Science, Princeton University

Chiara Hirschhorn, B.S. Biology, University of Konstanz

Daniel Chae, B.S. Computer Science, Princeton University

Connie Santangelo, B.S. Biology, Bowling Green State University

Lindsey Cunningham, B.S. Biology, Bowling Green State University

Tracy Togba, B.S. Biology, Bowling Green State University

Peer Review

Journals: eLife, Science Advances, PNAS
Grants: IMPRS Project Grant, IMPRS Travel Grant

Skills

Computational

Languages: Python (Expert), R (Intermediate), MATLAB (Intermediate)
Applications: Bayesian inference, statistical analysis, data visualization, machine learning, deep learning, computer vision, and image processing
Libraries: Stan, tensorflow, keras, pytorch, scikit-learn, OpenCV

Biological

Physiology: electrophysiology, histology, ophthalmoscopy, fish lateral line disruption and visualization
Microscopy: scanning and transmission electron microscopy, confocal, fluorescence, and general light microscopy

References

Iain D. Couzin

Director, Max Planck Institute of Animal Behavior
Professor, University of Konstanz
Department of Collective Behaviour
icouzin@ab.mpg.de
+49 7531 88-4928

Daniel D. Wiegmann

Associate Professor
Bowling Green State University
Department of Biological Sciences
ddwiegm@bgsu.edu
+1 (419) 372 2691

Verner P. Bingman

Distinguished Research Professor
Bowling Green State University
Department of Psychology
vbingma@bgsu.edu
+1 (419) 372 6984

Sheryl L. Coombs

Professor Emeritus
Bowling Green State University
Department of Biological Sciences
scoombs@bgsu.edu
+1 (419) 372 1206