Blair Costelloe

Curriculum Vitae
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She/Her

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EDUCATION

| 2014 | Ph.D. | Princeton University, Ecology and Evolutionary Biology |
Advisor: Dan Rubenstein

2010   M.A.   Princeton University, Ecology and Evolutionary Biology
Advisor: Dan Rubenstein

2007   B.A.   Washington University in St. Louis
Anthropology major, Spanish minor; *Summa Cum Laude*

ACADEMIC EMPLOYMENT

2016 - present   Postdoctoral Fellow
Dept. of Collective Behavior, Max Planck Institute of Animal Behavior
Centre for the Advanced Study of Collective Behaviour, University of Konstanz
Dept. of Biology, University of Konstanz

2014 - 2016   Research Associate
Rubenstein Lab, Dept. of Ecology and Evolutionary Biology, Princeton University

2014 - 2015   Lecturer
Department of Ecology and Evolutionary Biology, Princeton University

Employment breaks

9/2020 - 12/2021 – **Maternity leave**

GRANTS, AWARDS AND FELLOWSHIPS

2023   Centre for the Advanced Study of Collective Behavior Travel Grant   €5400
To present at Animal Behavior Society meeting and International Mammalogical Congress

2023- European Commission Marie Sklodowska-Curie Doctoral Network Grant   €2,777,854
2026   "WildDrone: Autonomous drones for nature conservation missions" – International
interdisciplinary doctoral training network grant. I was a member of the core writing team, and
the main representative of the wildlife ecology domain.

2022   Centre for the Advanced Study of Collective Behavior Small Project Grant   €5000
"Documentary Palaces" - funding for a collaborative course with Merz Academy of Fine Arts

2022   Christiane Nüsseln-Volhard Stiftung Awardee   €4800
Competitive stipend to support excellent early career scientists with children

2021   Animal Behavior Society Caregiver Award

2020	Centre for the Advanced Study of Collective Behaviour small project grant	€10,000
	"Combining drone-based behavioral observation with long-term data for deeper insights into collective processes" – collaborative project with J.T. Kerby (Aarhus University) and Guassa Gelada Research Project. Project delayed due to political conflict in Ethiopia.	
2017 - 2019	European Commission Marie Sklodowska-Curie Individual Fellowship	€171,460
	"Mechanisms of collective predator detection and information transfer in African ungulates"	
2017	University of Konstanz Zukunftskolleg Young Scholars Grant	€9973
2017	University of Konstanz Zukunftskolleg Investment Grant	€9375
	Funding to purchase a field vehicle in Kenya	
2017	NVIDIA GPU Hardware Grant	
2014	Animal Behavior Society Warner Clyde Allee Competition Finalist	
2013	Princeton University Deans Fund Summer Travel Grant	
2013	American Society of Mammalogists Student Travel Grant	
2012	Princeton Research Symposium Poster Prize	
2012	Animal Behavior Society Student Research Grant	`$1000
2010	Philadelphia Explorers Club Stephen Chapman Schroeder Scholarship	$1000
2010	National Science Foundation Graduate Research Fellowship Honorable Mention	
2009	Princeton University EEB Department Summer Research Grant	
2007	John W. Bennett Prize to the Outstanding Graduating Senior in Anthropology	

PUBLICATIONS *equal contribution; †student mentee   **Google Scholar profile**

11. Koger B†, Hurme E, **Costelloe BR**, O'Mara MT, Wikelski M, Kays R, and Dechmann DKN. 2023. An automated approach for counting groups of flying animals applied to one of the world's largest bat colonies. *Ecosphere* 14: e4590.

    Participated in fieldwork and data collection, data processing and writing and editing of manuscript.

10. Chen J*, Hu M*, Coker DJ, Berumen ML, **Costelloe BR**, Beery S, Rohrbach A, and Elhoseiny M. 2023. MammalNet: A large-scale benchmark for mammal recognition and behavior understanding. *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*: 13052-13061.

    I served as a domain expert for animal behavior and ecology. I ensured the project aligned with the needs of behavioral and wildlife researchers and contributed to writing and revising the manuscript. Only 25% of submitted papers were accepted to this conference.

9. Koger B†, Deshpande A, Kerby JT, Graving JM, **Costelloe BR***, and Couzin ID*. 2023. Quantifying the movement, behavior, and environmental context of group-living animals using drones and computer vision. *Journal of Animal Ecology.* 92: 1357-1371.

    Co-senior author. I provided the scientific motivation, field data, and partial funding to develop this method. Along with the first author, I processed the data, refined the method and wrote and revised the manuscript.
    - Cover article - July 2023 issue
    - Interview on RegioTV (in German)
    - Report on 3Sat NANO (in German)
    - One of the most-read articles in *Journal of Animal Ecology*

8. Tuia D*, Kellenberger B*, Beery S*, **Costelloe BR***, Zuffi S, Risse B, Mathis A, Mathis M, Van Langevelde F, Burghardt T, Kays R, Klinck H, Wikelski M, Couzin ID, van Horn G, Crofoot M, Stewart C, and Berger-Wolf T. 2022. Perspectives in machine learning for wildlife conservation. *Nature Communications* 13: 792.

As the only lead author from the ecology domain, I provided much of the ecological perspective in this piece. I created the figures and contributed significantly to the writing and revision of the manuscript.

- Top 25 Life and Biological Sciences Papers of 2022
- Article in Bionieuws magazine (in Dutch)
- Prompted a new EU Horizon Europe funding call

7. Graving JM, Chae D, Naik H, Li L, Koger B[†], **Costelloe BR**, and Couzin ID. 2019. DeepPoseKit, a software toolkit for fast and robust animal pose estimation using deep learning. *eLife* 8: e47994.

  I provided the scientific motivation and data necessary to apply DeepPoseKit to drone footage. This is the first demonstration of pose estimation from such imagery.

6. **Costelloe BR** and Rubenstein DI. 2018. Temporal structuring of vigilance behaviour by female Thomson's gazelles with hidden fawns. *Animal Behaviour* 145: 87-97.

5. **Costelloe BR**. 2018. Participation by a male Grant's gazelle in the defense of a fawn. *African Journal of Ecology* 56: 378-380.

4. **Costelloe BR** and Rubenstein DI. 2015. Coping with transition: offspring risk and maternal behavioral changes at the end of the hiding phase. *Animal Behaviour* 109: 217-225.

3. **Roberts BA** and Rubenstein DI. 2014. Maternal tactics for mitigating offspring risk during the postpartum period in Thomson's gazelle. *Behaviour* 151: 1229-1248.

2. **Roberts BA**. 2012. An attack by a warthog, *Phacochoerus africanus*, on a newborn Thomson's gazelle, *Gazella thomsonii*. *African Journal of Ecology* 50: 507-508.

1. **Roberts BA**. 2012. Perinatal behavior of a Grevy's zebra (*Equus grevyi*) mare and foal. *Journal of Ethology* 30: 205-209.

Preprints and papers in progress - manuscripts available upon request

Bennitt E*, **Costelloe B***, Koger B, Wielgus E, Masunga G, and Caron A. Conservation counts: combining artificial and human intelligence to document the largest ever-counted Cape buffalo mega-herd. *Submitted*

TEACHING EXPERIENCE

Merz Academy of Fine Arts

Collaborating Scientist Documentary Palaces (Summer 2022)

  I collaborated with Merz Academy faculty to deliver a course on story-telling with scientific data. Students drew on my research to produce original projects using diverse media, including print-making, textiles, and virtual reality. I delivered lectures on my research, consulted individually with students, and provided feedback during project development.

University of Konstanz

Team Instructor Animal Behaviour (Summer 2018, 2019, 2020)
  Advanced Masters Course on Collective Animal Behaviour (2018, 2019, 2022)

Princeton University

Instructor of Record Integrative Dynamics of Animal Behavior (Fall 2014)
  Evolution and Behavior of the Sexes (Spring 2014)

Assistant Instructor Animal Behavior (Spring 2012 & 2013)
  Evolution and Behavior of the Sexes (Spring 2009)

Writing Instructor Junior Writing Tutorial (Fall 2010)

Princeton Prison Teaching Initiative

Team Instructor   Environmental Science (Spring 2014)

MENTORING AND SUPERVISION

PhD students

> **Elena Iannino**, University of Konstanz
> Co-supervised with Martin Wikelski
> Project: "Scouting drones to prevent human wildlife conflict in livestock grazing systems"
> *Expected degree completion in 2027*

2022   **Benjamin Koger**, IMPRS – Quantitative Behaviour, Ecology & Evolution, University of Konstanz
Co-supervised with Iain Couzin
Dissertation title: "Using computer vision to study animal behavior in natural environments"
Current position: Assistant Professor, University of Wyoming

Masters students

2019   **Felicitas Oehler**, University of Konstanz
Thesis title: "Structure and associations within plains and Grevy's zebra herds during a disturbance"
Current position: PhD student, Wildlife Research Unit of Baden-Württemberg & University of Vienna

2019   **Sven Lauke**, University of Konstanz
Thesis title: "Behavioral responses to UAVs by wild ungulate herds"
Current position: PhD student, Justus Liebig University

Undergraduate students

2023   **Andreas Bachmann**, University of Konstanz
Thesis title: "'Exploring the alignment of the Grevy's zebra with earth's magnetic field: A drone-based observational approach"

2016   **Jennifer Zhao**, Princeton University - Fieldwork supervision
Thesis title: "Horsing around: quantifying the resilience of the social networks of *Equus caballus*"

2012   **Youngin Lim**, Princeton University - Fieldwork supervision
Thesis title: "Collective vigilance and risk management: anti-predator vigilance behavior in Thomson's gazelle (*Eudorcas thomsonii*)"

2010   **Sully Carmona**, Princeton University - Fieldwork supervision
Thesis title: "The effects of predation risk on maternal behavior of the Thomson's gazelle"

2009   **Zackory Burns**, Princeton University - Fieldwork supervision
Thesis title: "The interaction of leadership, risk assessment and information exchange in plains zebra (*Equus burchelli*)"

Dissertation committees
Jeroen Hoekendijk, Wageningen University. Defended January 2024
Kasper Hlebowicz, Wageningen University.
Felicitas Oehler, University of Vienna.

PRESENTATIONS

Invited talks

2024   Workshop - Computer Vision for Ecology. European Conference on Computer Vision. Milan, Italy. *Invited for September 2024*.

Workshop – RUNE: Robots for Understanding Natural Ecosystems. IEEE Conference on Robotics and Automation. Yokohama, Japan. *Invited for May 2024*.

Department seminar – Department of Biology, University of Washington. Seattle, WA.

2023   Plenary – Workshop on Biohybrid Systems in Animal Behavior. Association for the Study of Animal Behavior & the Office of Naval Research. Swansea, Wales.

Symposium – The Relative Contributions of Social Bonds to the Movement of Ungulate Herds. 13th International Mammalogical Conference. Anchorage, AK.

Workshop – Using Drones and Computer Vision to Study Animal Movement and Behavior in the Wild. Animal Behavior Society Annual Meeting. Portland, OR.

Department seminar – Centre for Biodiversity and Environment Research, University College London. London, UK.

Department seminar – Department of Ecology, Evolution and Behavior, University of Minnesota – Twin Cities. St. Paul, MN.

2022   Department seminar – Department of Biological Sciences, East Tennessee State University, Johnson City, TN.

Plenary – AniMove Summer School. Radolfzell, Germany.

2021   Symposium – Weaving the Future of Animal Behavior: Technological Advances to Reveal the Secret Lives of Animals. Animal Behavior Society Annual Meeting. Online.

2020   Thematic session – Capturing Ecology Across Scales Using New Technology. British Ecological Society Annual Meeting. Online.

2019   Workshop – Machine Learning in the Behavioral Sciences. Association for the Study of Animal Behaviour Summer Meeting. Konstanz, Germany.

Seminar – Linking Individual Behavior to Community Responses in Changing Landscapes. Max Planck-Yale Center for Biodiversity Movement and Global Change. New Haven, CT.

Department seminar – Department of Biology, Dartmouth College. Hanover, NH.

2018   Seminar – Wildlife Tracking from Unmanned Aerial Vehicles with Machine Learning. Wageningen University. Wageningen, Netherlands.

2014   Symposium – Allee Symposium for Graduate Research. Animal Behavior Society Annual Meeting. Princeton, NJ.

Department seminar – Department of Biology, University of Pennsylvania. Philadelphia, PA.

Contributed talks

2020   Animal Behavior Society Annual Meeting. Online.

2019   Behavior 2019. Chicago, IL.

Association for the Study of Animal Behaviour Summer Meeting. Konstanz, Germany.

2018   Animal Behavior Society Annual Meeting. Milwaukee, WI.

2015   Animal Behavior Society Annual Meeting. Anchorage, AK.

2013   Animal Behavior Society Annual Meeting. Boulder, CO.

American Society of Mammalogists Annual Meeting. Philadelphia, PA.

Posters

2019   Gordon Research Conference on Movement Ecology of Animals. Barga, Italy.

2018   International Society of Behavioral Ecology Conference. Minneapolis, MN.

2017   Behaviour 2017. Estoril, Portugal.

2012   Princeton Research Symposium. Princeton, NJ. *Poster prize winner.*

SERVICE AND LEADERSHIP

Editorial

2023 - 2024   Co-editor, Special Issue "Conservation, ecology and artificial intelligence: advances and symbiotic solutions" - *Methods in Ecology and Evolution*

Grant Management and Administration

2023 - 2026   Conservation Exploitation Manager - WildDrone Project
I communicate the findings and technological developments of the project to practitioners in the wildlife conservation sphere in order to encourage uptake of our results and maximize the impact of the WildDrone project.

Acting Coordinator for Ecology and Conservation Theme - WildDrone Project
I coordinate PhD student recruitment, research projects, and curriculum within the Ecology and Conservation theme, and manage applications for wildlife research permits in Kenya.

Diversity, Equity and Inclusion

2022 - 2023   Co-Chair – Max Planck Institute of Animal Behavior Diversity, Equity and Inclusion Working Group

2014 - 2016   Leader and founding member – Princeton EEB Women in Science Partnership

Grant and Peer Review

2016 - present Grant Review College member – British Ecological Society

2015 - present Student Grant reviewer – Animal Behavior Society

Peer review: African Journal of Ecology, The American Naturalist, Animal Behaviour, Animal Cognition, Behavioral Ecology, Behavioral Processes, Biology Letters, Communications Biology, Current Zoology, Ecosphere, International Journal of Biodiversity and Conservation, ISPRS Journal of Photogrammetry and Remote Sensing, Journal of Ethology, Journal of Neuroscience Methods, Oikos, PeerJ, Scientific Reports

Societies and Conferences

2023   Workshop leader - "Using Drones and Computer Vision to Study Animal Movement and Behavior in the Wild." – Animal Behavior Society Annual Meeting. Portland, OR.

2019   Organizing Committee member – Association for the Study of Animal Behavior (ASAB) Summer Conference

Workshop leader - "Machine Learning in the Behavioral Sciences" – ASAB Summer Conference

Session moderator – ASAB Summer Conference

2015   Session moderator – Animal Behavior Society Annual Meeting

2016 - 2017   Mammal Biodiversity Committee – American Society of Mammalogists

2011 - 2017   Informatics Committee – American Society of Mammalogists

PROFESSIONAL DEVELOPMENT, SKILLS AND CERTIFICATIONS

Certifications

Certified Remote Pilot (A1/A3) – European Aviation Safety Agency

Certified Remote Pilot – United States Federal Aviation Administration

Workshops

2022   A.I. for Science Bootcamp, Max Planck Computing and Data Facility

2018   Social Networking Analysis Workshop, Max Planck Institute for Ornithology

2016   Data and Modeling in Collective Behavior Workshop, New Jersey Institute of Technology

2014   NextProf Science Diversity Workshop, University of Michigan

Professional Skills Development

2020   Negotiation and Conflict Management, Max Planck Society Training Seminar

2017   SenseFly Drone Operator Training

2013   Talking About Your Teaching, McGraw Center for Teaching and Learning, Princeton University

Classroom Observation and Feedback, McGraw Center, Princeton University

Understanding How Students Learn, McGraw Center, Princeton University

2012   Designing a Course, McGraw Center, Princeton University

Graduate Student Writing in the Sciences, McGraw Center, Princeton University

2008   Assistant Instructor Training, McGraw Center, Princeton University

Technical Skills

Software: Microsoft Office, Pix4D, Adobe Suite, project management software (Asana, Notion), GitHub, BORIS, QGIS, Overleaf

Programming: Python, R

Fieldwork: Behavioral observation, off-road driving, drone piloting (fixed-wing and multi-copter), safety & logistics, camera trapping, project organization, team leadership, field-based teaching

SOCIETY MEMBERSHIP

International Society of Behavioral Ecology (since 2018)

Association for the Study of Animal Behaviour (since 2017)

International Bio-Logging Society (since 2017)

British Ecological Society (since 2015)

Animal Behavior Society (since 2009)

American Society of Mammalogists (2009 to 2018)

OUTREACH

2017 - 2022   Curator, Animal behavior YouTube channel (>38,000 subscribers)

2016 - 2022   Manager of department Twitter account (@CollectiveBehav)

2019   Guest curator – @RealScientists Twitter account

2018   Public research lecture – Max Planck Day

2016   Guest curator – @BioTweeps Twitter account

Presenter – "A Day in Digitopolis" Public Science Day, Arts Council of Princeton

2015   Visiting scientist – Monmouth Junction Elementary School Science Fair