



The Max Planck Institute of Animal Behavior at its sites in Konstanz and Radolfzell offers an international, interdisciplinary, and collaborative environment that opens up unique research opportunities. The goal of our basic research is to develop a quantitative and predictive understanding of the decisions and movements of animals in their natural environment.

We are seeking 1-2 postdocs (m/f/div) with a quantitative background and enthusiasm for tackling biological questions to join our interdisciplinary and international team studying **communication and collective behavior in animal groups**. The researcher(s) will be based at the Max Planck Institute of Animal Behavior and the University of Konstanz, located in **Konstanz**, Germany.

## **Postdoc (m/f/div) on Quantitative analysis of acoustic communication and collective behavior in animal groups**

### **Research:**

The research will focus on **analysis of movement and acoustic data** to understand how animals use vocal signaling to coordinate collective behaviors, as part of the [Communication and Coordination Across Scales Project \(CCAS\)](#). CCAS is an interdisciplinary collaborative project that integrates behavioral field biology with complex systems, collective movement, bioacoustics, and machine learning.

### **Qualifications:**

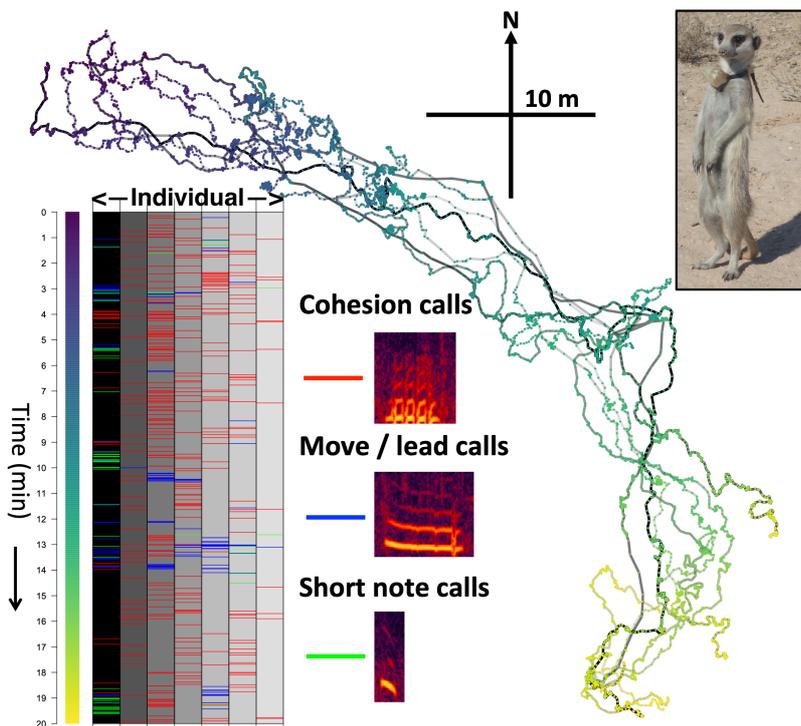
We are seeking candidates with an interest in developing and employing computational approaches to the study of animal behavior and communication. This call is open to candidates from all scientific backgrounds who can articulate how their interests and training prepare them for this position. Applicants should hold, or be about to obtain, a PhD degree in any scientific field. Programming skills and an enthusiasm for tackling challenging analytical problems are essential. Applicants should ideally have prior experience with the analysis of spatial, timeseries, acoustic, or network data, and/or experience with machine learning. Strong communication skills and ability to work as part of an interdisciplinary team are also essential.

### **Duties:**

The research will focus on analysis of simultaneous tracking data (movement, acoustic, and behavioral) recorded from entire social groups across three species. Candidates may work on one or more of the broadly defined topics below, or develop new directions in collaboration with other researchers on the project:

- *Call detection and classification using machine learning:* Develop acoustic recognition software to analyze acoustic data from tracking collars using supervised and/or unsupervised machine learning
- *Behavioral state recognition using machine learning:* Develop software to identify behavioral states at individual and group levels using multi-sensor tag data
- *Individual decision-making:* Develop and apply analytical methods to study how individuals in groups integrate spatial and acoustic information to make behavioral decisions about movement and vocal production
- *Information flow through groups:* Use information theoretic or other approaches to quantify how individuals influence one another and how information flows through groups
- *Modeling collective behavior:* Develop models linking behavioral interactions to collective outcomes across different systems

While extensive field work is not envisioned, if feasible researchers will have the opportunity to visit some of the field sites to gain insight into the study species.



Here's some of the tracking data that you could be analyzing!

Trajectories show high-resolution (1 Hz) movement data from all individuals within a single meerkat group over an example period of 20 minutes, with colors (blue to yellow) representing the passage of time. Inset shows the vocalizations (colored lines) produced by each individual (column) over time, highlighting three types of vocalizations known to be associated with group coordination. Image at top right shows a meerkat wearing one of our tracking collars.

Similar tracking data will be available from multiple species including meerkats, coatis, and spotted hyenas.

#### Further project details:

In the CCAS project we are leveraging innovations in tracking technology and computational modeling to determine how vocal communication influences collective behavior in animal groups. Specifically, we are recording movements and vocal signals simultaneously from all members of wild animal groups at a high resolution, and across varying degrees of spatial dispersion. Our focus is on three mammal species that solve a common set of coordination problems, but differ in spatial cohesiveness: meerkats (highly cohesive groups), coatis (moderately cohesive), and spotted hyenas (fission-fusion). In each species, we aim to 1) fit at least one entire social group in the wild with tags that continuously record fine-scale movements and vocalizations, 2) combine supervised and unsupervised machine learning approaches to identify animal calls and movement states, 3) develop probabilistic modeling approaches to reveal how individuals integrate spatial and acoustic information, how information flows through groups, and how behavioral interactions give rise to collective outcomes, and 4) conduct targeted audio playback experiments to isolate causal relationships driving collective dynamics. Combining these approaches with long-term data from existing field studies will allow us to shed light on both unifying features underlying coordination mechanisms across animal societies and differences imposed by distinct socio-ecological constraints.

#### Supervision and research community:

Researchers will be jointly supervised by Dr. Ariana Strandburg-Peshkin (collective behavior) and Dr. Marie Roch (bioacoustics / machine learning), and will also engage with our international [team of collaborators](#) which includes computational and behavioral researchers. The University of Konstanz and the Max Planck Institute for Animal Behavior together form a thriving research community representing a global hotspot for collective behavior and animal movement research. Researchers will also have the opportunity to join the [Centre for the Advanced Study of Collective Behaviour](#), an interdisciplinary research community integrating biology, computer science, physics, psychology, economics, and other fields to tackle questions in collective behavior.

#### Our offer:



The position is offered initially for 1 year with the possibility of extension for an additional 2 years contingent on performance. We offer an interesting job in an open-minded team, a responsible and varied workplace in a growing interdisciplinary and international research institute. The payment is made in accordance with your experience and qualification and the collective agreement for the public service (TVöD-Bund, E 13).

For further information regarding these positions, please feel free to contact **Dr. Ariana Strandburg-Peshkin** ([astrandburg@ab.mpg.de](mailto:astrandburg@ab.mpg.de)).

The Max Planck Society endeavors to employ more severely disabled people. Applications of severely disabled persons are expressly welcome. The Max Planck Society strives for gender and diversity equality. We welcome applications from all backgrounds. For details see [http://www.mpg.de/equal\\_opportunities](http://www.mpg.de/equal_opportunities).

### **Are you interested?**

The positions are available until filled. For full consideration, applicants should submit the following via email to Dr. Ariana Strandburg-Peshkin ([astrandburg@ab.mpg.de](mailto:astrandburg@ab.mpg.de)) **by 31 January 2022**. Please compile all documents into a single PDF and email as an attachment named YourSurname\_application.pdf. Please include:

1. Cover letter / research statement (1 – 3 pages) addressing the following prompts:
  - Describe your scientific background and research interests, and explain how they relate to the project
  - Describe one or more specific research questions / directions you would be interested to tackle using the dataset(s) available in this project, and explain how you would go about addressing them.
2. CV
3. Names and contact information for 2 - 3 references (these will only be contacted for short-listed candidates)
4. Indication of where you heard about this job (optional, and will not be used in the assessment of your application – this information will help us in our future attempts to reach broad and diverse

