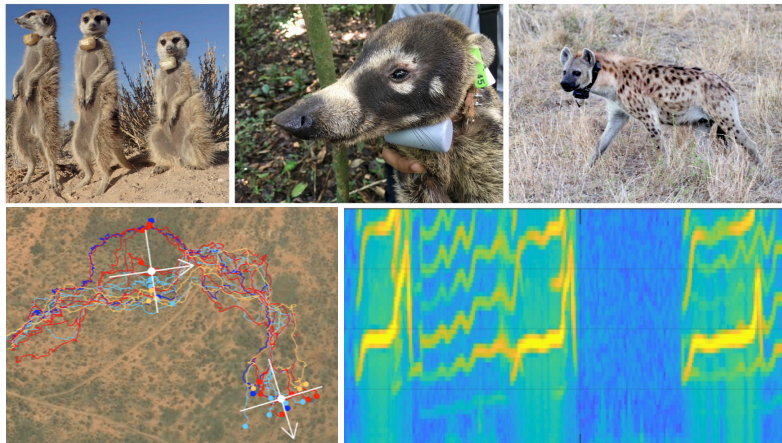# TWO post doc positions offered (*analysis of collective movement* and *bioacoustics/machine learning*) to join an interdisciplinary collaborative project on communication and collective behavior in animal groups

1. Post doc in *analysis of collective movement*
   - Location: Department for the Ecology of Animal Societies, Max Planck Institute of Animal Behavior / Department of Biology, University of Konstanz (Konstanz, Germany)
   - Research Group: Ariana Strandburg-Peshkin
2. Post doc in *bioacoustics and machine learning*
   - Location: Department of Computer Science, San Diego State University (San Diego, USA)
   - Research Group: Marie Roch

We are seeking two post docs to join our interdisciplinary and international team studying *communication and collective behavior in animal groups*. The post docs will take part in a new HFSP-funded project bringing together behavioral field biology with emerging movement and acoustic tracking technologies and quantitative analysis tools. The post doc based at the University of Konstanz will focus on analysis of collective movement, while the post doc based at San Diego State University will focus on bioacoustics and machine learning. The two post docs will work closely with one another and with the rest of the team to link these areas. Further information can be found below.

POSITION 1. Postdoctoral Fellow in *Analysis of Collective Movement*

- *Department:* Max Planck Institute of Animal Behavior, Department for the Ecology of Animal Societies / University of Konstanz, Department of Biology
- *Location:* Konstanz, Germany
- *Anticipated start date:* January 2020 (some flexibility is possible)
- *Salary:* TV-L E13 (standard German salary scale for post docs)
- *Description:* Full time (100%) position with one-year initial term and possible two-year extension contingent on performance

Duties:

The selected candidate will work at the Max Planck Institute of Animal Behavior / University of Konstanz (Dr. Ariana Strandburg-Peshkin) in collaboration with San Diego State University (Dr. Marie Roch), University of Zurich (Dr. Marta Manser), James Cook University (Dr. Ben Hirsch), and Michigan State University (Dr. Kay Holekamp). The candidate will focus on quantitative analysis of simultaneous tracking data (movement, acoustic, and behavioral) recorded from entire social groups across three social species. They will develop and apply analytical methods to study how individuals in groups integrate spatial and acoustic information to make movement decisions and how information flows through animal groups. They may also develop simulation models linking behavioral interactions to collective outcomes across different systems.

Required qualifications:

1. PhD in a relevant area
2. Demonstrated publication record
3. Enthusiasm for tackling biological questions with computational approaches
4. Demonstrated competency in many of the below areas:
    a. Analyzing and interpreting large datasets
    b. Analysis and modeling of time series, spatial, and/or network data
    c. Ability to construct complex programs in languages used for scientific programming such as Python, R, or Matlab
    d. Strong critical thinking and writing skills
5. Ability to conduct research semi-autonomously
6. Strong communication skills and enthusiasm for working as part of an interdisciplinary team

Desired qualifications:

1. Experience with developing theoretical / simulation models
2. Knowledge of statistical mechanics / information theory
3. Experience with machine learning
4. Demonstrated commitment to diversity

POSITION 2. Postdoctoral Fellow in *Bioacoustics and Machine Learning*

- *Department:* San Diego State University (SDSU) Department of Computer Science
- *Location:* San Diego, California, USA
- *Anticipated start date:* January 2020 (some flexibility is possible)
- *Salary:* 56,000 – 62,5000, commensurate with experience
- *Description:* Full time position with one-year initial term and possible two-year extension contingent on performance

Duties:

The selected candidate will work for San Diego State University (Dr. Marie Roch) in collaboration with University of Konstanz (Dr. Ariana Strandburg-Peshkin), University of Zurich (Dr. Marta Manser), James Cook University (Dr. Ben Hirsch), and Michigan State University (Dr. Kay Holekamp). The candidate will develop acoustic recognition software using both supervised and unsupervised learning as part of a project to determine how vocal communication influences collective behavior in animal societies. This work will be done across three study systems where all adult individuals have been collared with instruments that collect fine-scale vocal, movement, and position data.   The candidate will work closely with other team members to develop probabilistic modeling approaches to reveal how individuals integrate spatial and acoustic information, how information flows through the groups and how behavioral interactions give rise to collective outcomes.

Required Qualifications:

1. PhD degree in a relevant area
2. Demonstrated publication record
3. Enthusiasm for tackling biological questions with computational approaches
4. Demonstrated competency in many of the below areas:
    a. Analyzing and interpreting large data sets
    b. Knowledge of machine learning and statistics
    c. Ability to construct complex programs in languages used for scientific programming such as Python, R, or Matlab
    d. Strong critical thinking and writing skills
5. Ability to conduct research semi-autonomously
6. Strong communication skills and enthusiasm for working as part of an interdisciplinary team

Desired Qualifications

1. Experience studying animal communication
2. Experience with deep learning models
3. Demonstrated commitment to diversity

More information on the project

The post docs will engage with an interdisciplinary and international team of researchers underatking a large-scale project on *Communication and Coordination Across Scales*. In this 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.

Both post docs will focus on analysis and modeling of the large, complex, and novel datasets produced by our team. They will be integrated into our interdisciplinary collaboration, and will have the opportunity to interact with both computational and behavioral researchers. While extensive field work is not envisioned, post docs will have the opportunity to visit some of the field sites to gain insight into the study species.

<u>Apply</u>

The positions are available until filled. For full consideration, applicants should submit the following via email to either Marie Roch (for bioacoustics position; *mroch@sdsu.edu*) or Ariana Strandburg-Peshkin (for collective behavior position; *arianasp@gmail.com*) **by 30 October 2019**. Applicants wishing to be considered for both positions are welcome to submit a single application and indicate their preferences in the cover letter. Please compile all documents into a single PDF and email as an attachment named YourSurname_application.pdf.

1. cover letter addressing their interest in the position and qualifications (1-3 pg)
2. curriculum vitae
3. unofficial transcripts
4. a sample publication
5. names and contact information for three references
6. contact information