

# **ASAB Winter Meeting 2024 Program and Abstracts**



**12<sup>th</sup> and 13<sup>th</sup> December 2024  
Edinburgh and virtual**

## **Welcome to the ASAB winter meeting 2024!**

Research in the field of animal behaviour is affected by researchers' assumptions and expectations, impacting how projects are conducted, behaviours are interpreted, research questions are addressed, and taxa are represented. In addition, the choice of which animal subject to be included is not random, as recently summarised by the STRANGE framework<sup>1</sup>. The robustness of research findings can also often be unclear without replications and open science practices. Finally, like other academic fields, animal behaviour is also shaped by historical biases influencing whose research is recognised as influential and skewing the scientific discourse.

Recognising the impacts of these biases presents an opportunity for positive change. At the ASAB Winter Meeting 2024, we explore biases in animal behaviour research, and discuss a comprehensive system change towards fairness and inclusion of diverse perspectives. To ensure new insights and more robust science, this transformative shift involves evaluating community needs, fostering cultural changes, and implementing explicit policies.

Best wishes,

Claudia Wascher (She/Her), Cédric Aumont (He/Him), Chiara Benvenuto (She/Her), Nicola Koyama (She/Her) and Vivek Nityananda (He/him)

**(the organising committee)**

---

<sup>1</sup> Webster, M. M., & Rutz, C. (2020). How STRANGE are your study animals? *Nature*, **582**, 337–340. <https://doi.org/10.1038/d41586-020-01751-5>

## Table of Contents

<a href="#"><u>Code of conduct</u></a>	4
<a href="#"><u>Scientific committee</u></a>	5
<a href="#"><u>Our sponsors</u></a>	6
<a href="#"><u>Programme at a glance</u></a>	7
<a href="#"><u>Programme step-by-step</u></a>	8
<a href="#"><u>Plenary abstracts</u></a>	14
<a href="#"><u>Talk abstracts</u></a>	18
<a href="#"><u>Poster abstracts</u></a>	40

# Code of conduct

## *A safe ASAB winter meeting 2024 for everyone*

As the organisational committee of the Association for the Study of Animal Behaviour (ASAB) Winter Meeting 2024, it is our fundamental mission to host an event for animal behaviour professionals to meet, connect, develop new collaborations, learn from each other, share scientific ideas, and build knowledge. Bringing together people from different walks of life, we wish this conference to be held in a respectful, inclusive, and welcoming atmosphere. To ensure this, we ask all participants to adhere to our [Code of Conduct](#).

Please contact the organising committee ([asabwinter2024@gmail.com](mailto:asabwinter2024@gmail.com) or any member of the organising committee on-site) if you believe there has been a breach of the code of conduct. Any alleged breach would be treated seriously, in confidence, and if appropriate, referred to the ASAB council.

# Scientific committee

This year's ASAB Winter Meeting would not have been feasible without the help of a dozen volunteers who helped us review the 120 abstracts for talks and posters we received. We are very grateful for their help and general advice. Thanks to them, we were able to have all abstracts reviewed blindly and independently by two reviewers.

Sophia Daoudi-Simison, Newcastle University, United Kingdom

Friederike [freddy] Hillemann, Durham University, United Kingdom

Christos Ioannou, University of Bristol, United Kingdom

Andrew King, Swansea University, United Kingdom

Barbara Klump, University of Vienna, Austria

Amy Leedale, University of Salford, United Kingdom

Alan McElligott, City University of Hong Kong, China

Ljerka Ostojić, University of Rijeka, Croatia

Elva Robinson, University of York, United Kingdom

Mukta Watve, Independent Researcher, Pune, India

Many thanks to the scientific committee for abstract review and general advice.

## Our sponsors

Drinks reception sponsored by:

THE  
ROYAL  
SOCIETY  
PUBLISHING

Poster prizes sponsored by:



CAMBRIDGE  
UNIVERSITY PRESS

Please check out the web-exhibit for discounted books for conference attendees:

<https://www.cambridge.org/gb/universitypress/conferences/association-study-animal-behaviour-winter-meeting>

## Programme at a glance

	Thursday 12 <sup>th</sup>		Friday 13 <sup>th</sup>
09:00 09:30	Coffee & Poster setup		
09:30 09:40	Welcome	9:20 10:30	Plenary 3 Tatsuya Amano <i>Chair: Jennifer Colbourne</i>
09:40 10:40	Plenary 1 Malin Ah-King <i>Chair: Cédric Aumont</i>	10:30 11:00	Coffee break
10:40 11:20	Coffee break & Early Career poster session	11:00 12:20	Talk session 3 <i>Chair: Amanda Seed</i>
11:20 12:30	Talk session 1 <i>Chair: Phyllis Lee</i>	12:20 12:30	ASAB medal <i>Chair: Melissa Bateson</i>
12:30 14:00	Lunch ASAB AGM	12:30 14:00	Lunch LGBTQIA+ networking Mentoring meet & greet
14:00 15:00	Plenary 2 Antica Čulina <i>Chair: Amy Leedale</i>	14:00 15:00	Plenary 4 Tinbergen Lecture <i>Chair: Melissa Bateson</i>
15:00 16:05	Talk session 2 <i>Chair: Leonida Fusani</i>	15:00 16:20	Talk session 4 <i>Chair: Elva Robinson</i>
16:05 16:35	Coffee break & Poster setup	16:20 16:30	Closing remarks
16:35 17:15	Panel discussion <i>Chair: Claudia Wascher</i>		
17:15 19:45	Reception & Posters		

# Programme step-by-step

## Day 1 – 12<sup>th</sup> December 2024

### Early career poster session:

1. **Andreea Miscov, Emma S. McEwen, Justin Ales & Amanda Seed:** Virtually anything can happen: investigating short-term memory in capuchin monkeys using virtual environments
2. **Anustup Bandyopadhyay & Anja Guenther:** The impact of alternative reproductive tactics on the cognitive abilities of male wild house mice
3. **Anwesha Acharjee, Snigdha Mukhopadhyay, Sandip Murmu & Sumana Annagiri:** Effect of a pyrethroid pesticide on the behaviour of a tropical non-target ant
4. **Ari Drummond & Mark Briffa:** The bold and the bald: Boldness in hermit crabs is associated with an increase in chelar sensory armaments
5. **Arpita Ghosh, Aakash Madhav Rao, Prarthna Middha, Shambhavi Rai & Bittu Kaveri Rajaraman:** Investigating context-specific advantages of depression-like behaviour in wild-type zebrafish (*Danio rerio*)
6. **Denise Piringer, Dani Biegle, Conny Bourgmeyer, Leonida Fusani & Clíodhna Quigley:** Receiving mixed signals? Masked audiovisual courtship affects female ring dove responses in between- & within-bird tests
7. **Foozhan Kheradmand, Ehsan Saeidi & Marina Salas:** Activity budget of captive spotted hyenas at zoo Planckendael
8. **Ivana Dumičić & Ljerka Ostojić:** Do horses use human pointing and a wooden marker as discriminative cues? A replication of Proops et al. (2010).
9. **Jacob Ligorria, Antoine Grissot, Dariusz Jakubas, Martyna Syposz & Katarzyna Wojczulanis-Jakubas:** Endless bounty or fading paradise? Examining Ashmole's hypothesis in the zooplanktivorous little auk *Alle alle*
10. **Jeanne Seressia, Marie Gellé, Fabien Cornilleau, Julie Lemarchand, Léa Lansade, Ludovic Calandreau & Vitor Ferreira:** Quail-gnition: social motivation and inhibitory control performance in Japanese quail (*Coturnix japonica*)
11. **Joey Felsch, Eduard Mas-Carriò, Stéphanie Mercier, Judith Schneider, Sofia Forss, Erica van de Waal & Luca Fumagalli:** Influence of an urbanized environment on the diet of wild vervet monkeys assessed by DNA metabarcoding of faecal samples
12. **Katy Hartley, Beth A. Ventura & Anna Wilkinson:** Comparing observational and experimental approaches to studying reptile cognition
13. **Laura J. Douglas & Susan D. Healy:** Energetic expenditure of nest building in zebra finches
14. **Lea Mimeault & Robert B. Weladji:** Forest elephants in a human-dominated landscape: are they risk-takers?
15. **Louise Mackie, Jeanne Trehorel & Ludwig Huber:** Social learning in dogs under different attentional states of the caregiver
16. **Lucy Emma Garden:** Finding Nemo's sounds: Classifying acoustic communication of orange clown anemonefish through deep learning
17. **Noah Locke, Sota Hoshi, Laurie Mitchell, Vincent Laudet & Shunichi Kasahara:** Virtual Nemo: A new system to reduce the number of lab animals required for behavioural experiments
18. **Paige Barnes Benjamin Robira Stephanie Mercier & Sofia Forss:** Primate cognition in an anthropogenic landscape: using a mechanistic model to uncover problem-solving skills
19. **Petra Šarić, Antica Čulina, Petra Anić & Ljerka Ostojić:** Barriers to Open Data re-use: a mapping review



20. **Rebecca Grut, Michael J. Toscano, Jean-Loup Rault, Julie M. Collet & Maria Vilain Rørvang:** Developing an apparatus to investigate prosocial behaviour in laying hens housed in commercial conditions
21. **Rebecca Oscarsson & Per Jensen:** Play ontogeny in young chickens is affected by domestication, tameness and sex
22. **Biggin S., Price H., Tinsley M.C. & Martin-Ordas G.:** Towards an understanding of how particulate matter air pollution affects cognition in wild bees
23. **Sourabh Biswas, Kalyan Ghosh, Swarnali Ghosh, Akash Biswas & Anindita Bhadra:** Scent marking as a social cue: Behavioral responses of free-ranging dogs to conspecific and heterospecific scents
24. **Tim Prezeli:** Challenges in lab settings for evolutionary research on *Nephilengis cruentata*: A study of sexually dimorphic growth
25. **ManyDogs Project, Tiziana Srdoc, Ljerka Ostojić:** ManyDogs Project: A big team science approach to addressing biases in canine research
26. **Vijay Kumar & Vadamalai Elangovan:** Comparative niche differentiation of frugivorous and insectivorous bat species in foraging habitats

Virtual posters:

1. **Aditya Panigrahy, Chiti Arvind & V.V. Robin:** Using an automated detection algorithm to understand the singing phenology of a Western Ghats endemic species
2. **Mónika Jablonszky, Miklós Laczi, Gergely Nagy, Zoltán Tóth, Sándor Zsebők & László Zsolt Garamszegi:** Associations between song features and neighbourhood in the social network of a wild passerine
3. **Camille A. Troisi & Barbara C. Klump:** Beyond gender – asking questions at animal behaviour conferences
4. **Pablo Arechavala-Lopez, María J. Cabrera-Álvarez, Cairsty DePasquale, Joachim G. Frommen, Theodora Fuss, Lisa Jacquin, Nick A. R. Jones, Sabine Kraus, Amelia Munson, Marcel Simsch, Cassandra Scheibl, Carmen Schwietz, Helen Spence-Jones, Maëlan Tomasek, Camille A. Troisi, A. Li Veiros, Susanne R. K. Zajitschek & Libor Závorka:** The effect of habituation on fish behaviour – a multi-lab, multi-species experiment
5. **Hoi-Lam Jim, Shinya Yamamoto & Joshua M. Plotnik:** Do Asian elephants (*Elephas maximus*) wait for a larger food reward in a delay of gratification task?
6. **Jie Gao, Yumi Yamanashi & Masayuki Tanaka:** Odd-item search using computer-controlled touchscreen tasks in domestic goats (*Capra aegagrus hircus*): a pilot study
7. **Rebecca O'Sullivan, Nikki Marks, Catherine Hambly, Craig Tambling & Michael Scantlebury:** Cape buffalo movement and behaviour in thicket landscapes in South Africa
8. **Syeda Maryam Hussain, Evelyn Saba, Usman Rashid, Mansoor Abdullah, Aayesha Riaz, Muhammad Fiaz, Farooq Iqbal & Zahid Manzoor:** Effects of varied photo-period durations and Red Korean Ginseng extract supplementation on growth performance, feed efficiency, and health status in New Zealand white rabbits
9. **Yufei Xiao & Yinong Zhao:** Topological alignment interaction moderates informed individual transmission in animal group-like self-propelled particles
10. **Snata Chakraborty, Etienne Lein & Alex Jordan:** Why wait near your prey? - Spatiotemporal strategies in collective hunting in social spiders *Stegodyphus dumicola*
11. **Anupama Nayak Manel, Anna Stöckl & James J. Foster:** How to train your hawkmoth – Comparing differential conditioning paradigms in the hummingbird hawkmoth
12. **Mélisande Aellen, Rithwik J. Cherian, Richard P. Mann, Christopher Krupenye, Takao Sasaki & Dora Biro:** How does fish group size matter in an asymmetric dominance effect experiment on rational decision-making?

13. **Ioannis Leris, Nicholas Koutsikos, Leonidas Vardakas, Alexandros Ntakos, Sofia Laschou, Petros Kouraklis & Eleni Kalogianni:** Living with the invader: The impact of alien invasive mosquitofish on native killifish behaviour
14. **Fiona French, Steve Good, Karim Mokaddem, Kat Finch & Naomi Frost:** Soundscapes and songs: acoustic analysis with great apes
15. **Özge Kilic & Dino McMahon:** Building an automated system to record and analyse the social behaviour of termites

Talk session 1 (chair: Phyllis Lee)

- **Kate Otter & Denise Pope:** Biology but make it gay: A case study teaching queer and feminist perspectives in biology to first-year undergraduates
- **Karyn A. Anderson:** Evolutionary paradoxes, underreporting, and species bias: Unpacking prejudice in same-sex sexual behaviour research
- **Alper Yelimlieş, Katherine Anabel Albán Morales, Çağlar Akçay & Sonia Kleindorfer:** Female song and territorial defence across seasons in the Galapagos yellow warbler
- **Arezo Shamsgovara, Lennart Winkler, David Wheatcroft, Niclas Kolm & John L. Fitzpatrick:** Rethinking sex-biased assumptions in mate choice copying research: are males more willing to mate choice copy than we currently expect?
- **David M. Shuker, Thomas Green & Eleanor H.Z. Gourevitch:** Towards an inclusive paradigm for the identification of the causes and the prediction of the consequences of sexual selection

Talk session 2 (chair: Leonida Fusani)

- **Anna Korzeniowska, Holly Root-Gutteridge & Andrea Sommesse:** A handbook in canine research methods – in search of peer learning and standardization for the field
- **Vanessa Wilson:** How can we improve the way we measure animal cognition? Examples from studies on visual attention
- **Annika Peter, Vera Brust, Wieland Heim, Ommo Hüppop, Thiemo Karwinkel, Thomas Klinner, Florian Packmor, Georg Rüppel & Heiko Schmaljohann:** Keep track of migration – Methodological improvements of radio-telemetry for free-flying songbirds
- **Colin Hendrie & Alasdair Pickles:** Misinterpretations, mice and motivation to behave
- **Cassandra L. Raby, Jessica Cusick, Kirsty Graham & Joah Madden:** Online animal behaviour conferences mitigate biases in participation

Panel discussion (chair: Claudia Wascher)

- **Ari Drummond,** University of Plymouth
- **Lena Grinsted,** University of Portsmouth
- **TBC**
- **Niki Khan,** Ace Aquatec
- **Tim Prezelj,** The Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU), Ljubljana

Reception and poster session:

1. **Ambre Salis, Jean-Paul Lena, & Thierry Lengagne:** How subtle protocol choices can affect biological conclusions: Great tits' response to allopatric mobbing calls
2. **Andrew Whiten, Cassandra Gunasekaram, Federico Battiston, Onkar Sadekar, Cecilia Padilla-Iglesias, Maria A. van Noordwijk, Reinhard Furrer, Andrea Manica, Jaume Betranpetit, Carel P. van Schaik, Lucio Vinicius & Andrea Bamberg Migliano:** Population interconnectivity shapes the distribution and complexity of chimpanzee cumulative culture
3. **Anna Dorling:** The influence of naturally neuroactive nectars on bee cognition

4. **Antonella M.C. Torrisi, Ines Nolasco, Elisabetta Versace & Emmanouil Benetos:** Unsupervised computational analysis of chicks' vocal repertoire
5. **Aubrey Alamshah, Anne B. Clark & Benjamin Marshall:** The morphological and behavioral responses of jungle crows (*Corvus macrorhynchos*) to environmental and human-induced changes
6. **Isabel Damas-Moreira, Lauriane Bégué, Eva Ringler & Birgit Szabo:** Do they care who is there? Geckos adjust their behaviour towards familiar and unfamiliar handlers according to context
7. **Calum Sims:** Biases in animal metacognition
8. **Carlos Pinto:** Experimenters' assumptions and pigeons' perceptions: are we speaking the same language?
9. **Charlie Russell:** Leveraging experience across contexts: Falconry and raptors
10. **Chay Halliwell, Andrew Beckerman, Samantha Patrick & Ben Hatchwell:** Coordination of care reduces conflict and predation risk in a cooperative breeding bird.
11. **Edward W. Legg & Ljerka Ostojić:** Historic diversity and representation in publications in Animal Behaviour
12. **Elisabetta Versace:** Early biases: The adaptive role of transient predispositions in young animals
13. **Femi Gabriel Oyeniyi & Emmanuel O. Ewuola:** Thermoregulatory response of West African dwarf does of varying coat colouration to diurnal changes in temperature
14. **Georgia Cash, David Fisher & Callum McLean:** The role of transgenerational maternal effects in the evolution of sociality in subsocial animals
15. **HaDi MaBouDi, Mark Roper, Marie G. Guiraud, Lars Chittka, James A.R. Marshall & Andrew B. Barron:** Moving with purpose: The interplay of active visual sampling and decision-making for pattern recognition excellence
16. **Helen K. Mylne, Dan W. Franks, Jackie Abell, Colin M Beale, Lauren JN Brent, Jakob Bro-Jørgensen, Kate E. Evans, Jordan D.A. Hart, Dabwiso Sakala & David Youldon:** Escaping bias in social network analysis: How to avoid overestimating the strength of social bonds.
17. **Iris D. Bontekoe, Ellen O. Aikens, Anna Schlicksupp, Lara Blumenstiel, Ricardo G. Honorato, Isabel Jorzik & Andrea Flack:** Exploring biases in the study of social animal migrations: a systematic literature review
18. **Janire Castellano Bueno & Vittoria Elliott:** Welfare integration as way of reducing bias in wild animal studies
19. **Jefferson García-Loor, Andrew C. Katsis, Lauren K. Common & Sonia Kleindorfer:** Exploration and foraging behavior: A field validation with neophilia test
20. **Joanna Brebner, Maria Loconsole, Daniel Hanley & Vera Vasas:** Through an animal's eye: the implications of diverse sensory systems in scientific experimentation
21. **Johanna Stenfelt, Vincent Bombail, Hanna Sassner, Björn Forkman & Maria Vilain Rørvang:** Olfactory conditioning to modulate affective state of horses?
22. **F. Blake Morton, Dom Henri, Kristy A. Adaway, Carl D Soulsbury & Charlotte R. Hopkins:** Are scientific communications on wild animal psychology biasing our perceptions of species? A nationwide test with wild red foxes
23. **Lina Oberließen & Marianne Heberlein:** Research at the wolf science center
24. **Marianne Sarah Freeman & Paul Rose:** Do too many analysts spoil zoo research?
25. **Mauro Chivite, Yoorana Peyre, Amaya Albalat & Gema Martin-Ordas:** Stress responses under extreme cold in bumblebees (*Bombus terrestris*)
26. **Michael J.M. Gachomba & Jennifer L. Cook:** Investigating the effects of reciprocity and individual differences in shaping trophallaxis networks in honeybees
27. **Narmin I. Beydizada, Samuele Martini, Michelle Beyer & Cristina Tuni:** Who is likely to cheat? Linking personality to deception in a gift-giving spider

28. **Nishant Kumar, Sanath K Muliya, Lallianpuii Kawlani, Pooja Latwal, Priyanka Justa & Neil:** Feeding faith, fostering AMR (Antimicrobial resistance): The hidden costs of human-rhesus macaque proximity in Delhi
29. **Rachael Miller, Vedrana Šlipogor, Kai R. Caspar, Jimena Lois-Milevicich, Stephan Reber, Claudia Mettke-Hofmann & Megan Lambert:** Evolutionary correlates of neophobia across the avian clade
30. **Robert Kelly, Lisa Leaver & Paul Rose:** A bias in budgets: inferring welfare from behavioural comparisons in the wild and the zoo
31. **Romane Phelipon, Anaïs Ascione, Alice Ruet, Aline Bertin, Sophie Biau, Cécile Arnould, Laetitia Boichot & Léa Lansade:** New indicators of emotion in horses
32. **van Schaik, R.M.C, Meagher, R.K & Díez-León, M:** Uncovering pen dependant behavioural patterns and decrease potential stress in farmed American mink (*Neogale vison*)
33. **Rowan Kuminski, Claudia A.F. Wascher, Friederike Hillemann & Barbara C. Klump:** Understanding and addressing barriers to LGBTQIA+ participation in bird ringing in the United Kingdom
34. **Russell A. Hill, Katarzyna Nowak, Laura R. LaBarge & Andrew T. L. Allan:** Impacts of habituation and tolerance of observers on behavioural data collection
35. **Natacha Bande, Stephanie Mercier, Benjamin Robira & Sofia Forss:** Predator response in an urban world: behavioural interactions between vervet monkeys and domestic dogs
36. **Tommaso Sacca, Zoe Turner, Elisa Protopapa & Sofia Forss:** The interlink between socio-ecological factors and cognitive development on foraging competence in wild meerkats
37. **Louise Kandler, Sarah Brown, Alistair Lawrence & Vincent Bombail:** Wistar rats exhibit individual differences in ultrasonic vocalisations in response to playful handling (tickling).
38. **Peyre, Y. & Martin-Ordas, G.:** Impact of low and high temperatures in bumblebees' (*Bombus terrestris*) cognition
39. **Noémie Hennes, Christine Briant, Camille Lorcet, Alice Ruet & Léa Lansade:** Behaviour as indicator of physical tiredness in horses
40. **Silvia Damini\*, Arnout Lindeman\*, Petra Sumasgutner & Thomas Bugnyar:** Foraging decisions of wild ravens in unfamiliar and unpredictable environments (\* Equal Contribution)

Day 2 – 13<sup>th</sup> December 2024:

Talk session 3 (chair: Amanda Seed)

- **Sally E. Street, Inga Hamilton & Susan D. Healy:** Anthropocentric biases may explain research disparities between animal tool use and nest building
- **Stotra Chakrabarti\*, Genevieve E. Finerty\*, Natalia Borrego\*, Joseph K. Bump & Margaret C. Crofoot:** Building Bridges from Boxes: the role of under-studied populations in expanding the horizons of animal behaviour (\*Equal Contribution)
- **Genevieve E. Finerty\*, Natalia Borrego\*, Sky K. Alibhai, Zoe C. Jewell, Philippe Tschanz, Trevor Balone, Tebelelo Gabaikanye, Moisaopodi Gana, Supula Monnaanoka, Mosepele Mamou, Sokwa Pudidaroma, Meno Tschiana, Mpho Tshiana, Alessandro Araldi, Margaret C. Crofoot, Steve Henley, Pogiso 'Africa' Ithuteng & Monika Schiess-Meier:** The crossroads of tradition and modern technology: integrative approaches to studying carnivores in low density ecosystems (\* Equal Contribution)
- **Drew M. Altschul\* & Matthias Allritz\*:** ManyPrimates: an empirical approach that addresses bias in comparative psychology (\*Equal Contribution)
- **Benjamin G. Farrar & Ljerka Ostojić:** The illusion of science in animal cognition
- **Nicola F. Koyama & Susanne Zajitschek:** The geographies of animal behaviour field research

Talk session 4 (chair: Elva Robinson)

- **Jayashree Mazumder:** Gender, affiliation, and research biases in Indian primate studies: Trends, disparities, and pathways to equity

- **Karendeep Sidhu, Lesley Lancaster & Greta Bocedi:** Addressing colonial bias in animal behaviour research?
- **Natacha Rossi, Alexis Buatois, Valentin Lecheval & Ebi George:** Designing inclusive international conferences: insights from Animal Behaviour Live
- **Mike M. Webster & Christian Rutz:** How STRANGE are your study animals?
- **Kasim Rafiq, Neil Jordan, J. Weldon McNutt, John Neelo, Nina Attias, Dee Boersma, Meredith S. Palmer, Jennifer Ruesink & Briana Abrahms:** Removing barriers to immersive field biology is critical for advancing ecology
- **Marina Papadopoulou & Andrea Afruni:** The scientific impact of gender in Animal Behaviour

# **Plenary Abstracts**

## Public Outreach Lecture



**Malin Ah-King**

Stockholm University/Örebro University

### **The female turn - how evolutionary science shifted perceptions about females**

This talk traces the history of how evolutionary biology transformed its understanding of females from being coy, reserved and sexually passive, to having active sexual strategies and often mating with multiple males. Why did it take so long to discover female active sexual strategies? What prevented some researchers from engaging in sexually active females, and what prompted others

to develop this new knowledge? Based on interviews with scientists in the field as well as the scientific literature, the analysis shows many factors that formed the researchers' understandings of females, and also how ignorance about females was and continues to be produced. This history provides an illustrative example by which we can learn to recognize biases and identify gaps in knowledge.

### **Biography**

Malin Ah-King is an Associate Professor in Gender Studies at Stockholm University/Örebro University

She is an evolutionary biologist (PhD) and gender researcher focusing on gender/queer perspectives on biology and feminist science studies of contemporary sexual selection research. Her current project explores a controversy over sex differences in evolutionary biology. She investigates the relationship between science and society through analysing the production of scientific knowledge as well as ignorance. She has published in biological and gender journals, and makes regular contributions to radio, newsprint and podcasts. You can find out more about Malin [here](#).



**Antica Čulina**  
Ruđer Bošković Institute

### **Doing credible science – why would you care?**

Science is the systematic and objective study of the world: done according to a fixed plan, evidence-based, unbiased, and not dependent on cognitive biases. Thus, science should be credible by its definition. Yet, evidence shows that it is often not so. Across scientific fields, studies are not replicable nor reproducible, largely due to different biases including pre-publication bias (e.g. p-hacking)

and publication bias. Response to this 'crisis' has been a slow but inevitable change to the new era of how we do science: openly and transparently.

In this talk, I will briefly overview the issues with the current research and reward system, and the challenges and benefits of transitioning to a new, open, and more reliable system. I will provide some tips on making your work more robust and on benefiting by using open science tools and practices. These include the use of open data, application of integrative methods of evidence synthesis, registration of studies, and open software.

### **Biography**

My work lies on the interface between open science and meta-science in ecology. With this, I strive to enable ecological research to reach its full potential by researching the scientific process itself, understanding and optimizing it. Before I moved into open science research, I studied the evolutionary ecology of pair bonds, and life-history trade-offs, using mostly birds as a model system. I have co-founded [SPI-Birds Network and Database](#) and the Society for Open, Reliable, and Transparent Ecology and Evolutionary biology ([SORTEE](#)). Further, I contribute to other open science initiatives such as GoFAIR discovery in, UNESCO Open Science, and Research Data Alliance. I work as a senior research associate at the Ruđer Bošković Institute, Croatia. Before moving back to Croatia, I did my PhD in evolutionary ecology at the University of Oxford, and then worked as a researcher (on open science in ecology) at the Netherlands Institute of Ecology.





**Tatsuya Amano**  
The University of Queensland

**Language barriers in science:  
consequences and solutions**

The issue of language barriers—difficulties faced in communicating information when it involves a language other than one’s first language—has long been recognised in the scientific community. Historically, this issue has been perceived as the “English” barrier faced primarily by non-native English speakers, resulting in the lack of a concerted effort to solve the problem from within the scientific community. However, recent research on language barriers in

science has revealed that this is a multi-faceted problem that can have serious implications for scientists—both native and non-native English speakers—, the science they do, and how science is applied to addressing global challenges and communicated to the wider community. Drawing on the findings of recent research, I will first provide a framework for understanding how language barriers can impede science in three major ways: barriers to (1) the generation of scientific knowledge by non-native English speakers, (2) the global synthesis of scientific knowledge scattered across different languages, and (3) the application of English-language knowledge to local problems in countries where English is not widely spoken. I will then introduce some of our recent research on different types of language barriers in science, focusing on those potentially relevant to the field of animal behaviour. I will conclude the presentation by proposing a comprehensive checklist of practical solutions for individuals, institutions, journals, conferences, and funders for overcoming language barriers in science, with the aim of promoting more multilingual, equitable, inclusive, and thus truly global science and academia.

**Biography**

Tatsuya is a conservation scientist, committed to making the conservation community, and more broadly academia, more evidence-based, diverse, and inclusive. Tatsuya has been leading [the translatE project](#), which aims to understand the consequences of language barriers in science. The project has shown how language barriers can impede evidence-based biodiversity conservation in three major ways: barriers to (1) the global synthesis of scientific evidence, (2) the application of English-language evidence to local decision making, and (3) the generation of scientific evidence by non-native English speakers. Tatsuya works as a Senior Lecturer at the School of the Environment and Centre for Biodiversity and Conservation Science, at The University of Queensland.

# **Talk**

# **Abstracts**

## **Evolutionary paradoxes, underreporting, and species bias: Unpacking prejudice in same-sex sexual behaviour research**

Karyn A. Anderson

University of Toronto, Canada

Since its earliest reporting, same-sex sexual behaviour research has been heavily influenced by human bias. The objective of this talk is to examine how human biases have shaped the understanding of same-sex sexual behaviour, particularly the framing of same-sex sexual behaviour as paradoxical, its underreporting, and the narrow focus of same-sex sexual behaviour research in few species. Early work on same-sex sexual behaviour, as well as more recent studies which reevaluate what we know about same-sex sexual behaviour will be examined to understand how bias has heavily impacted this field. We will explore the impacts of same-sex sexual behaviour research, and how science is informed by, and informs, broader human rights issues. Understanding these influences can help us to reimagine same-sex sexual behaviour research outside of the limitations of evolutionary paradoxes or naturalistic fallacies.

## **Building bridges from boxes: the role of under-studied populations in expanding the horizons of animal behaviour**

Stotra Chakrabarti<sup>1\*</sup>, Genevieve E. Finerty<sup>2\*</sup>, Natalia Borrego<sup>2\*</sup>, Joseph K. Bump<sup>3</sup> & Margaret C. Crofoot<sup>2,4</sup> (\*Equal Contribution)

<sup>1</sup>Department of Biology, Macalester College, Saint Paul, MN, USA

<sup>2</sup>Department for the Ecology of Animal Societies, Max Planck Institute of Animal Behavior, Konstanz, Germany

<sup>3</sup>Department of Fisheries, Wildlife & Conservation Biology, University of Minnesota Twin Cities, Saint Paul, MN, USA

<sup>4</sup>University of Konstanz, Germany

Model species/systems are fundamental to theorising animal behaviour, but a narrow focus on a few well-studied populations limits our understanding of the complete behavioural spectrum that species exhibit. Lions, for instance in resource rich habitats like the Serengeti, exemplify a model system which, while playing a central role in advancing our understanding of social behaviour, overlooks the behavioural plasticity observed in less-studied populations. Furthermore, these well studied populations are also associated with large research groups that dominate the available literature, which has historically not included local knowledge. Such a focus thus significantly biases the voices that are represented in animal behaviour research. We, a diverse group of researchers studying lions in under-studied systems, highlight some of the contexts underlying variations in lion behaviour, and advocate for the investigation of species behaviour across a gradient of ecological and evolutionary conditions. While classic study systems and model populations with longitudinal datasets are essential for comprehending the drivers of species behaviour, we must now expand our focus to assess how these behaviours manifest across a diverse range of conditions experienced by a species. We argue that this expansion will not only enhance our understanding of species ecology, but also promote a more inclusive approach that involves local knowledge, thereby fostering a more equitable and diverse representation of perspectives and backgrounds.

## **The illusion of science in animal cognition**

Benjamin G. Farrar<sup>1</sup> & Ljerka Ostojić<sup>1,2,3,4</sup>

<sup>1</sup>Department of Psychology, University of Cambridge, Cambridge, UK

<sup>2</sup>Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, Rijeka, Croatia

<sup>3</sup>Division of Cognitive Sciences, Faculty of Humanities and Social Sciences, University of Rijeka, Rijeka, Croatia

<sup>4</sup>Centre for Mind and Behaviour, University of Rijeka, Rijeka, Croatia

In the last decade, many scientific disciplines have started discussing and questioning the credibility of their findings: whilst the first issues brought up were primarily centred around replicability and statistical inferences, these have later been complimented by discussions regarding generalisability of results and lack of scientific theory. Here, we will illustrate how these issues relate to animal cognition and its long-standing tradition of critiquing the field's methods and interpretation of empirical findings. Importantly, we argue that a blind and narrow focus on the problem of replicability, and the procedures and Open Science tools that have been proposed to remedy it, may equally impede real progress by acting as a plaster for the issues that our field traditionally highlights as being important. We suggest that pluralism, alongside greater uncertainty tolerance and communication, scientific rigour, precision, and transparency should be central to discussions to improve the field. Finally, we highlight how expertise from animal cognition can offer important insights to discussions on replicability, generalisability, and scientific theory.

## **The crossroads of tradition and modern technology: integrative approaches to studying carnivores in low density ecosystems**

Genevieve E. Finerty<sup>1,2,3,4\*</sup>, Natalia Borrego<sup>1,2,5\*</sup>, Sky K. Alibhai<sup>6,7</sup>, Zoe C. Jewell<sup>6,7</sup>, Philippe Tschanz<sup>3,8,9</sup>, Trevor Balone<sup>3</sup>, Tebelelo Gabaikanye<sup>3</sup>, Moisaodi Gana<sup>3</sup>, Supula Monnaanoka<sup>3</sup>, Mosepele Mamou<sup>3</sup>, Sokwa Pudidaroma<sup>3</sup>, Meno Tschiamama<sup>3</sup>, Mpho Tshiamama<sup>3</sup>, Alessandro Araldi<sup>3</sup>, Margaret C. Crofoot<sup>1,2</sup>, Steve Henley<sup>3</sup>, Pogiso 'Africa' Ithuteng<sup>3</sup> & Monika Schiess-Meier<sup>3</sup> (\*Equal Contribution)

<sup>1</sup> Department of Biology, University of Konstanz, Konstanz, Germany

<sup>2</sup> Department for the Ecology of Animal Societies, Max Planck Institute for Animal Behavior, Konstanz, Germany

<sup>3</sup> Research Department, Leopard Ecology & Conservation, Gaborone, Botswana

<sup>4</sup> Wildlife Conservation Research Unit, Biology Department, University of Oxford, Oxford, United Kingdom

<sup>5</sup> The Lion Center, Department of Ecology and Evolution, University of Minnesota, St. Paul, MN, United States

<sup>6</sup> JMP Statistical Discovery LLC, Cary, NC, United States

<sup>7</sup> WildTrack, Nicholas School of the Environment, Duke University, Durham, NC, United States

<sup>8</sup> Agroscope, Agroecology and Environment, Zurich, Switzerland

<sup>9</sup> Department of Environmental Systems Science, Institute of Agricultural Sciences, ETH Zurich, Zurich, Switzerland

Studying large carnivores in semi-arid ecosystems is challenging due to their low densities and extensive home ranges. We showcase how traditional knowledge (i.e., the art of tracking) and modern technology can be combined to address these challenges, focusing on the African lion in the Central Kalahari region of Botswana. Combining GPS tracking and traditional San trackers' expertise, we present two case studies: (1) the individual identification of lions via footprint analysis and (2) the monitoring of territorial behaviour through GPS technology and non-invasive tracking. Our findings underscore the value of merging traditional tracking skills with contemporary analytical and technological developments to offer new insights into the ecology of carnivores in challenging environments. This approach improves data collection accuracy and efficiency and fosters a deeper understanding of wildlife, ensuring the conservation and sustainable management of these species. Our work advocates for the inclusion of indigenous knowledge in conservation science, highlighting its relevance and applicability across various disciplines.

## **Misinterpretations, mice and motivation to behave**

Colin Hendrie & Alasdair Pickles

University of Leeds

Mice are used extensively in laboratory models of human psychiatric disorders. These models are usually based on sensitivity to drug action and the animals themselves are secondary to the end points they produce. The present studies examined how much those who have published in this area know about the animals they work with. 571 questionnaires were sent out and 17.7% responded. 32.6% considered mice to be a highly territorial species. 30.3% considered them to be highly social. 42.7% of respondents believed there to be only slight differences between rats and mice, whilst 8.9% considered these species to be interchangeable. A second study sent out 2208 questionnaires and 261 (12%) responded. Results largely replicated findings from the first study with 35.2% considering mice to be territorial and 27% considering them to be highly social. This study also showed large variations in the use of a 'standard model of anxiety', the Elevated Plus Maze (EPM) and a similar lack of consensus about what was thought to cause anxiety in this model. It is possible therefore that the interpretation of much of the data in this area may be based on assumptions that are not backed up by evidence.

## **A handbook in canine research methods – in search of peer learning and standardization for the field**

Anna Korzeniowska<sup>1</sup>, Holly Root-Gutteridge<sup>2</sup> & Andrea Sommese<sup>3</sup>

<sup>1</sup>University of Surrey

<sup>2</sup>University of Lincoln

<sup>3</sup>Vetmeduni Vienna

Canine behaviour and cognition science has gained in popularity from the late 1990s on, with many labs around the globe focusing on studying topics ranging from neuroscience to perception of stimuli to social cognition including the human-dog relationship. However, while the field of canine behaviour and cognition is maturing, the standardization of methods or approaches has not seemed to follow. Methods of testing dog behaviour are often very idiosyncratic to the researchers carrying out the research and therefore may not be replicable. Results from one lab are often extrapolated without a comprehensive understanding of the entire canine population of reference. The combined effect of these factors represents a significant challenge to the advancement of canine science, particularly in terms of ensuring its robustness and rigour. Crucially, there is a risk that it may not fully align with the 3Rs. For those canine scientists who would like to carry out replication studies or learn from other's experience, methods sections in papers may not provide enough detail of their study protocols to make them feasible models. This is because these sections are typically very short and do not allow for a precise description of protocols and rarely, if ever, list what was tried and did not work. Additionally, studies that have not shown significant results, despite containing important lessons learnt, often do not get published. As a result, scientists – whether beginning their careers or new to the field – often end up drafting their methods from scratch, spending endless hours piloting and making mistakes which could be avoided if only they had access to clear protocols. To remedy this situation, we asked researchers working in the field of canine behaviour and cognition whether they would find a handbook containing methods, descriptions, and protocols for studying canine behaviour and cognition useful. The answer was a resounding yes and resulted in an interdisciplinary workshop funded by ASAB and held at Lincoln University in June 2024. There, we were joined by canine researchers from all around the world, in person and online. We successfully drafted the structure of a canine methods handbook and developed a roadmap for its production. We are currently open to adding both authors and reviewers. We plan to submit the handbook to publishers in late 2025.



## **The geographies of animal behaviour field research**

Nicola F. Koyama & Susanne Zajitschek

Liverpool John Moores University

Animal behaviour fieldwork often involves international collaboration and coordination with host country communities and organisations. However, historical relationships and power imbalances can perpetuate inequities. Calls for wider inclusion and authorship recognition within ecology and conservation science are growing, but in animal behaviour fieldwork this issue is less clear.

Reflecting on our own field research experiences, we examined publications in the journal *Animal Behaviour* to investigate potential bias in host country collaboration. We analysed articles published over the last ten years (2014-2024, n=162), categorising by study species' country, author affiliation, host country author affiliation, and author gender. Species were studied in over 50 countries, with lead author affiliations from 26 countries. Half of these affiliations were from the USA and UK, and 13 of the 26 countries were in Europe. All field studies in Asia included host country affiliation, while 84% of studies in Africa had none. Two-thirds of lead authors were women, while two-thirds of senior authors were men. We acknowledge the historical legacies that have contributed to this imbalance and the limitations of our analysis but highlight these biases to prompt discussion about challenges in collaboration with host countries and how to create more inclusive fieldwork practices.

## **Gender, affiliation, and research biases in Indian primate studies: Trends, disparities, and pathways to equity**

Jayashree Mazumder

The study investigates gender, affiliation, and research biases in Indian primate studies using a dataset of 315 publication records (in the wild habitats only) spanning several decades. Primate research in India has grown significantly, particularly since the late 20th century, fuelled by digital advancements and increased publishing accessibility, with the early 21st century marking a peak period. Publications from 2000 to 2012 constitute 40.6% of the dataset, reflecting heightened interest and investment. Gender analysis reveals a stark disparity: male researchers contribute 70% of publications compared to 30% by female researchers. This imbalance extends to senior authorship and high-impact journals, with male-led collaborations prevailing in higher-impact publications ( $p < 0.05$ ). Institutional affiliation strongly influences publication quality, with top-tier universities and collaborations with prestigious or foreign institutions significantly increasing acceptance rates in reputable journals ( $p < 0.05$ ). Foreign scholars benefit from biases favoring international collaborations, as evidenced by higher odds of publication in high-impact journals (odds ratio  $> 2$ ,  $p < 0.01$ ). This disparity underscores the challenges faced by Indian researchers in gaining global recognition. Research focus skews towards charismatic species like the Bengal slow loris and lion-tailed macaque, sidelining lesser-known species and local conservation needs, exacerbated by global funding priorities. Proposed solutions include promoting gender equity through mentorship and policy changes, supporting researchers from less prominent institutions, fostering equitable collaborations, and diversifying research funding to encompass neglected species and topics. Addressing these biases is crucial for fostering a more inclusive research environment and advancing primate studies and conservation in India.

**Biology but make it gay: A case study teaching queer and feminist perspectives in biology to first-year undergraduates**

Kate Otter & Denise Pope

Department of Biology UMass Amherst

One of the frontiers of animal behavior is challenging gendered norms and presupposed binaries that are embedded in our studies of animal behavior. This is especially essential given how gender-inclusive curriculum is one method of retaining and supporting diverse scientists in the field. I designed and taught a first-year seminar “Biology but make it Gay” in Fall 2022 and 2023, which challenged first-year college undergraduates to think critically about biology and especially animal behavior, from feminist and queer perspectives. Using an ethnographic approach, I document how the course shifted students’ thinking about sex, gender and same-sex sexual behavior with course assignments, concept maps and student reflections. As first-year students, this course came at a critical point in their college education, and I have been able to survey students 1 and 2-years post completion of the course. I also surveyed students to get their suggestions for researchers in the field seeking a more expansive understanding of animal behavior. This course provides a case-study of how gender inclusive teaching of animal behavior can affect a student’s desire to study biology and how they understand the nature of science.

## **The scientific impact of gender in Animal Behaviour**

Marina Papadopoulou<sup>1</sup> & Andrea Afruni<sup>2</sup>

<sup>1</sup>Swansea University, Imperial College London

<sup>2</sup>University of Groningen

In the last two decades, gender inequalities in science have constantly been revealed in a variety of scientific disciplines, with the form of skewed sex ratios among invited speakers in conferences, authorship in scientific journals and academic positions. Animal behaviour is a field with a high number of young female scientists, something that is often not reflected in senior academic positions. It remains questionable if we are slowly overcoming gender imbalances with historical roots, or the global obstacles of unconscious gender bias persist. Here, we collected and analysed data on gender composition of author groups of approximately 50,000 papers published between 2000 and 2020 in high impact factor journals of ecology, behaviour, and evolutionary biology. The analysis was focused on the proportion of female researchers in the authors' pool through time, along with their representation in the first and last author positions. Furthermore, we analysed the effect of the first author's gender and the gender ratio of the authors' group of each paper on the paper's citation performance. The examination and discussion on the underlying causes of our findings are vital for overcoming the existing gender inequalities and possible gender bias in animal behaviour.

## **Keep track of migration – Methodological improvements of radio-telemetry for free-flying songbirds**

Annika Peter, Vera Brust, Wieland Heim, Ommo Hüppop, Thiemo Karwinkel, Thomas Klinner, Florian Packmor, Georg Rüppel & Heiko Schmaljohann  
Carl von Ossietzky University of Oldenburg, Germany

For many decades, researchers have been tackling the challenge how to study the unbiased behaviour of free-flying songbirds on migration. The size of songbirds is often the limiting factor for the choice of tracking devices to record their flight behaviour. However, as technology is improving, it is now possible to attach radio-transmitters (<1g), which emit signals recorded by radio-antennae, to small songbirds. Here I present advantages and challenges of radio-telemetry aiming to get an ideally unbiased understanding of songbird migration using an automated radio-receiving system and double-blind analysis. In the German Bight, stationary radio-receivers now enable automated recordings of flights instead of the formerly used hand-held antennae which entailed a strong observer bias. The radio-tracking data is then analyzed double-blind using an algorithm which was developed and improved over many years of research. Sharing our experiences aims to stimulate the scientific discourse within the field of animal tracking, which is essential for methodological improvements. Only when biases are reduced to an absolute minimum, we can study the natural behaviour of animals in the wild.

## **Online animal behaviour conferences mitigate biases in participation**

Cassandra L. Raby<sup>1</sup>, Jessica Cusick<sup>2</sup>, Kirsty Graham<sup>3</sup> & Joah Madden<sup>4</sup>

<sup>1</sup>University of Leeds

<sup>2</sup>Utah Valley University

<sup>3</sup>University of St Andrews

<sup>4</sup>University of Exeter

Researchers in animal behaviour benefit from conference attendance for their training, networking and research dissemination. Yet opportunities to attend conferences are often biased towards individuals with the financial and logistical means to participate. Online conferences significantly increase accessibility by reducing these barriers, enabling a broader range of researchers from underrepresented regions and institutions to participate. In recent years, the Association for the Study of Animal Behaviour (ASAB) have hosted conferences online, either as an alternative to in-person sessions or as supplementary events on social media. Here we present an analysis of these online events, alongside feedback from attendees. We find that online conferences provide a more inclusive alternative to in-person events, evidenced by an observed increase in the number and global reach of conference delegates. However, the quality of engagement and networking was not as effective as in-person meetings. Despite this, the increase in accessibility promotes diverse and interdisciplinary partnerships, essential for removing biases around participation in scientific discourse.

## **Designing inclusive international conferences: insights from Animal Behaviour Live**

Natacha Rossi<sup>1</sup>, Alexis Buatois<sup>2</sup>, Valentin Lecheval<sup>3</sup> & Ebi George<sup>3</sup>

<sup>1</sup>School of Life Sciences, University of Sussex, UK

<sup>2</sup>Molecular toxicology group, Eawag, Dübendorf, Switzerland

<sup>3</sup>Humboldt University, Berlin, Germany

<sup>3</sup>Department of Ecology and Evolution, University of Lausanne, Switzerland

Contemporary academic practices often include barriers that disproportionately impact certain researchers, particularly through the medium of conferences. Attending international conferences is vital for receiving feedback, building collaborations, and accessing career opportunities. However, costs, travel, time constraints, and accessibility challenges can hinder participation. This presentation will highlight experiences from organizing inclusive, accessible, and sustainable events via the Animal Behaviour Live society, established during the pandemic to unite global animal behaviour researchers. Key design principles discussed include: (i) strategies to communicate effectively with less-connected researchers, (ii) an intersectional, fair, and balanced abstract selection process, (iii) accessible online event formats and technologies fostering community, and (iv) documenting international demographics in the field. We'll address the benefits and challenges of online-only events and provide recommendations to overcome these issues. Our goal is to advocate for reflexivity and critical platforms to reassess academic practices in light of intersectionality.

## **Removing barriers to immersive field biology is critical for advancing ecology**

Kasim Rafiq<sup>1,2</sup>, Neil Jordan<sup>2,3,4</sup>, J. Weldon McNutt<sup>2</sup>, John Neelo<sup>2</sup>, Nina Attias<sup>5</sup>, Dee Boersma<sup>1</sup>, Meredith S. Palmer<sup>6</sup>, Jennifer Ruesink<sup>7</sup> & Briana Abrahms<sup>1,2</sup>

<sup>1</sup>Centre for Ecosystem Sentinels, Department of Biology, University of Washington, Seattle, United States of America

<sup>2</sup>Botswana Predator Conservation, Wild Entrust, Maun, Botswana

<sup>3</sup>Centre for Ecosystem Science, School of BEES, University of New South Wales, Sydney, Australia

<sup>4</sup>Taronga Conservation Society Australia, Sydney, Australia

<sup>5</sup>Instituto de Conservação de Animais Silvestres. Campo Grande, Brasil

<sup>6</sup>Fauna & Flora, David Attenborough Building, Cambridge, United Kingdom

<sup>7</sup>Department of Biology, University of Washington, Seattle, United States of America

Observing animals and plants in their natural habitats is a cornerstone of ecological research and conservation efforts worldwide. Decades of progress in ecology and animal behaviour have been enabled and accelerated by field-based studies. Furthermore, field biology has been instrumental in driving successful conservation outcomes, providing pivotal data for informed conservation strategies and heightening global awareness of endangered species. A disconnect between data and the rich, real-world context in which it was gathered can hinder our ability to draw unbiased scientific inferences or test fundamental theories in natural systems and can undermine conservation actions. Despite the irreplaceable value of fieldwork in ecology, systemic barriers hinder its pursuit, disadvantage scholars engaged in immersive field biology over other research methods, and lead to biases in the field. Barriers to immersive field biology not only impede our ability to garner knowledge and foster conservation outcomes but also slow theoretical advancements. In this presentation, we unit diverse perspectives across geographies, career stages, and topics to discuss the scientific and societal value of grounding inquiry in the field and institutional barriers that disincentivise fieldwork and disadvantage those undertaking it, which are privately acknowledged but rarely discussed within biology. Moreover, we then provide a roadmap to overcome these barriers and recognise the value of fieldwork such that it advances both scientific insight and societal equity. This shift is necessary not only for the unbiased advancement of scientific knowledge but also for the conservation of our planet's invaluable yet threatened ecosystems.



**Rethinking sex-biased assumptions in mate choice copying research: are males more willing to mate choice copy than we currently expect?**

Arezo Shamsgovara, Lennart Winkler, David Wheatcroft, Niclas Kolm & John L.

Fitzpatrick

Department of Zoology, Stockholm University, Stockholm, Sweden

Mate choice copying is a form of social learning where individuals copy the choices of other individuals of the same sex. Traditionally, mate choice copying has been assumed to be stronger in females than males. Males were traditionally assumed to avoid mate choice copying as this would increase the risk of the copying male's sperm having to compete to the female's egg(s). This traditional framework has led to research effort of mate choice copying in females dwarfing that of males. Yet whether this sex-biased assumption in mate choice copying research is warranted has recently been challenged. Here, we examine male mate choice copying in a livebearing fish, the pygmy halfbeak (*Dermogenys collettei*). Female halfbeaks have sexual ornaments that advertise their reproductive receptivity and that males use when making mate choice decisions. Consequently, mate choice copying in halfbeaks may be beneficial (due to increased female receptivity) even at the costs of increased sperm competition. We tested this hypothesis using a dichotomous choice assay with two different treatments to determine if the presence of a rival male influences male mate choice decisions. This study sheds light on how males balance decisions to engage in mate choice copying and highlights the potential for female sexual ornaments to drive the evolution of complex male sexual behaviours.

## **Towards an inclusive paradigm for the identification of the causes and the prediction of the consequences of sexual selection**

David M. Shuker, Thomas Green, and Eleanor H.Z. Gourevitch

School of Biology, University of St Andrews

Sexual selection has resulted in a bewildering array of phenotypes associated with competition for gametes. Here we consider the tension between the simplifying paradigms used by evolutionary biologists and the exuberant diversity of sexual behaviours we see in nature. We scrutinise how anisogamy, the Darwin-Bateman Paradigm, Bateman gradients, and the Sexual Cascade, inform our understanding of sexual competition and the resulting diversity of traits shaped by sexual selection. We show that these frameworks do only a limited job of predicting behaviour, mapping rather poorly to competitive or choosy sexual behaviours. We also challenge the rhetoric of “paradoxical” sexual behaviours and the idea that it is meaningful to talk of “role-reversed” behaviours. Instead, we will offer an inclusive paradigm, based around placing ecology back at the centre of sexual selection. This paradigm allows a conceptual space for us to predict the full diversity of sexual behaviours and phenotypes we see. It is also not predicated on any normative versus non-normative sex roles or sexual behaviours, giving all outcomes of sexual and natural selection equal evolutionary validity and importance.

### **Addressing colonial bias in animal behaviour research?**

Karendeep Sidhu, Lesley Lancaster & Greta Bocedi

University of Aberdeen

Understanding the colonial history of our fields is important for understanding our own biases. Colonial perspectives and practices have a legacy in our field which have created and continue to create bias within our research. These biases can affect our knowledge production, how we view and validate as scientists, and how we conduct research. However, as decolonial narratives start to gain more recognition in animal behaviour, it can be daunting to know how to identify and address these biases. In this talk, I highlight tools and practices that can be beneficial in how to discern these biases and how to tackle them, specifically focusing on how we generate, discuss and disseminate knowledge.

## **Anthropocentric biases may explain research disparities between animal tool use and nest building**

Sally E. Street, Inga Hamilton & Susan D. Healy

Despite our best efforts, animal behaviour researchers are not immune from bias. Studying other species objectively is inherently challenging, especially for ‘charismatic’ and ostensibly human-like behaviours. Animal tool use is a prime example: often considered a hallmark of intelligence, tool use seems to attract a disproportionate amount of research attention compared to similar behaviours involving manipulative skill, particularly nest building. Here, we reveal striking disparities in the treatment of tool use and nest building in the animal behaviour literature. We find that tool use publications are more highly cited and make more frequent use of terminology suggestive of ‘intelligence’ and human-like cognition compared with nest building publications. These findings are not confounded by taxonomy: disparities persist even within studies of great apes and corvids. Further, we find that articles with more frequent use of ‘intelligent’ terminology are more highly cited, suggesting incentives for this kind of language in scientific articles. Given a lack of strong evidence that tool use and nest building require different cognitive and manipulative skills, we suggest that these research disparities may be driven by unconscious biases among researchers and that the widespread appeal of animal tool use is partly explained by anthropocentrism.

## **How STRANGE are your study animals?**

Mike M. Webster & Christian Rutz

School of Biology, University of St Andrews, UK

Animal behaviour researchers are working hard to improve reproducibility. The experiments and studies that we carry out are often susceptible to sampling biases, testing subjects that are not fully representative of the wider populations which we seek to understand. STRANGE is an acronym that captures sources of sampling bias: the Social background; Trappability; Rearing history; Acclimation and habituation; Natural changes in responsiveness; Genetic make-up; and Experiences of our test subjects. These factors are not problematic if properly accounted for but are cause for concern if overlooked. Sampling biases can impact the interpretation of experimental outcomes, limit generalisability of results, complicate comparisons between studies, and hamper reproducibility. STRANGE provides guidance on improving experimental designs and encourages researchers to discuss and declare causes and consequences of sampling biases when sharing their research. We hope that STRANGE will help to improve how animal behaviour research is conducted, reported and interpreted, with the ultimate goal of enhancing reproducibility.

## **How can we improve the way we measure animal cognition? Examples from studies on visual attention**

Vanessa Wilson

Universities of Neuchatel/Hull

Visual attention is a widely used measure in studying animal cognition, and the ability to differentiate visual stimuli can be informative to questions about social cognition, causal detection and memory. Interpretation, however, of implicit measures such as gaze can also be precarious, particularly in settings where it is not possible to implement eye tracking setups. Here, I outline six points of consideration when designing and carrying out cognitive studies using gaze measures. 1. What is the conceptual basis for the method, and how do the hypotheses link the stimulus to the response? 2. What paradigm is being employed to answer the research question, and is it the best way to test that question? 3. How can the results be interpreted in terms of real-world behaviour, and what will this tell us about the cognitive domain of interest? 4. Which cognitive mechanisms might this measure be tapping into – this may depend on whether one is measuring predictive gaze or posthoc measures. 5. Are there additional measures that can be taken that can help to validate the gaze response? 6. Can this approach be easily implemented with other species? Applying these examples more broadly, I will highlight how (a) an interdisciplinary approach to cognition can be beneficial to how we approach and measure problems, (b) it is important to consider the broader behavioural application and context of the studied response, and (c) applying robust but simple methods that can be used across different species and settings, will help to expand comparative cognition to a much more diverse set of taxa.

## **Female song and territorial defence across seasons in the Galapagos Yellow Warbler**

Alper Yelimlieş<sup>1,2</sup>, Katherine Anabel Albán Morales<sup>1,2</sup>, Çağlar Akçay<sup>3</sup>, Sonia Kleindorfer<sup>1,2,4</sup>

<sup>1</sup>University of Vienna, Austria

<sup>2</sup>Konrad Lorenz Research Center for Behavior and Cognition, Austria

<sup>3</sup>Anglia Ruskin University, UK

<sup>4</sup>Flinders University, Australia

The functions of birdsong have predominantly been studied in male birds, whereas females of many species also sing, particularly in the tropics. We studied the female song in the sedentary Yellow Warbler subspecies of the Galapagos Archipelago (*Setophaga petechia aureola*). We found that, unlike the commonly studied North American subspecies, female Galapagos Yellow Warblers sing commonly both solo songs and duet with their paired males. We then investigated whether female and male Yellow Warblers modulate their aggression and use of song in territory defence, both seasonally and in response to the sex of the conspecific intruder. To this aim, we carried out simulated territory intrusion experiments using solo male song, solo female song, and duet song playbacks across both breeding and nonbreeding seasons. Preliminary results suggest that males sang in response to the intruders regardless of season, while females sang fewer times in the breeding season compared to the nonbreeding season. Moreover, outside the breeding season, solo female intruders received more response from female territory owners. We discuss our results in relation to the breeding biology of Yellow Warblers and the sex-specific functions of song.

# Poster Abstracts



## **Effect of a pyrethroid pesticide on the behaviour of a tropical non-target ant**

Anwesha Acharjee<sup>1</sup>, Snigdha Mukhopadhyay<sup>1,2</sup>, Sandip Murmu<sup>1</sup>, Sumana Annagiri<sup>1</sup>

<sup>1</sup>Behaviour and Ecology Lab, Indian Institute of Science Education and Research Kolkata, India

<sup>2</sup>Laboratoire d'Éthologie Expérimentale et Comparée, Université Sorbonne, France

Large scale pesticide dispersion over several decades has led to widespread negative impact on biodiversity and social insects are most vulnerable to this loss. Few studies have explored the impact of pesticides on non-target species, fewer on ants from an ethological perspective. Our model system is *Diacamma indicum*, a tropical ponerine non-target ant whose natural habitat are sometimes contaminated by pesticides. We investigated the impact of field-relevant exposure of a pyrethroid pesticide, alpha-cypermethrin on the colony living and performance of a goal-oriented task of colony relocation in ants. Using 97 naturally collected ant colonies, we conducted three lab-based experiments incorporating double-blind randomised controlled trials to collect behavioural data at colony and individual levels. We identified and quantified pesticide induced behaviours in ants. Although colony size remained unchanged, pesticide negatively impacted relocation dynamics and nest choice in treatment colonies. Our results highlight the behavioural effects of pesticide on non-target ant species and further investigation is crucial in understanding the long-term ecological consequences.

## **The morphological and behavioral responses of jungle crows (*Corvus macrorhynchos*) to environmental and human-induced changes**

Aubrey Alamshah<sup>1</sup>, Anne B. Clark<sup>1</sup> & Benjamin Marshall

<sup>1</sup>Binghamton University

<sup>2</sup>University of Stirling

Jungle crows (*Corvus macrorhynchos*) are widely distributed across Asia, existing in a variety of landscapes undergoing human-driven change. To identify physical and behavioural responses of Jungle Crows to these changes, we conducted studies at both species-wide and local scales. We measured the hard tissue morphology of over 1,000 museum specimens, which showed that in areas such as Japan, Northern India, and the Philippines, Jungle Crows exhibited unique morphology that in some cases correlated with climatic measures. However, aside from these exceptions, morphological variation was relatively minor and did not reflect previously described taxonomic boundaries. To examine smaller-scale adaptations, we studied the behavior of a population of Jungle Crows occupying a mixed-use landscape in Northeast Thailand. This revealed behavioural responses to human disturbance, and active use of both forest and agricultural areas. The findings suggest an ability to react to disturbance in a shorter time frame, avoiding risky behavior in the presence of threats, but also the ability to exploit novel human-created resources.

## **How does fish group size matter in an asymmetric dominance effect experiment on rational decision-making?**

Mélisande Aellen<sup>1</sup>, Rithwik J. Cherian<sup>1</sup>, Richard P. Mann<sup>2</sup>, Christopher Krupenye<sup>3</sup>, Takao Sasaki<sup>1</sup> & Dora Biro<sup>1</sup>

<sup>1</sup>Department of Brain and Cognitive Sciences, University of Rochester

<sup>2</sup>School of Mathematics, University of Leeds

<sup>3</sup>Department of Psychological & Brain Sciences, Johns Hopkins University

This experiment examines a well-known example of irrational decision-making: the decoy effect. Here, an individual is presented with a choice between two, one of which is better in one aspect and the other in another. After an initial observation of a subject's preferences in this scenario, a third, less attractive and therefore irrelevant option (the decoy) is added. The decoy is considered "asymmetrically dominated" because it is designed such that it is completely inferior to one option (the target) but only partially inferior to the other (the competitor). The key finding is that this irrelevant alternative can, counterintuitively, shift the subject's preference between the two original options. Inspired by the study of Sasaki & Pratt (2011), we presented zebrafish with different habitat qualities as a choice response in this study. Two target habitats of approximately equal preference (A and B) were established by titrating substrate type against shade availability (e.g. A had a preferred substrate but less shade and B had a less preferred substrate but more shade). In addition, two asymmetrically dominated decoy habitats were created: DA had the same substrate but even less shade than A, and DB had an even less preferred substrate but the same level of cover as B). There were three treatments involving binary preference tests. In the first treatment, 10 fish chose between the two target habitats, A and B, to establish a preference ratio. In the second treatment, half of the other 10 fish encountered the decoy habitat of A (DA) first, and in the third treatment, the other half encountered the decoy habitat of B (DB) first, before choosing between habitats A and B. Each fish was tested only once in a treatment. Furthermore, ten groups of six individuals each were tested, with five groups in the A decoy habitat (DA) and another five groups in the B decoy habitat (DB). The data will reveal whether zebrafish make more rational decisions as a group or individually. The study will compare the results with data from other non-human animal species as part of a broader project on reasoning and rationality.

### **The effect of habituation on fish behaviour – a multi-lab, multi-species experiment**

Pablo Arechavala-Lopez<sup>1</sup>, María J. Cabrera-Álvarez<sup>2</sup>, Cairsty DePasquale<sup>3</sup>, Joachim G. Frommen<sup>4</sup>, Theodora Fuss<sup>5</sup>, Lisa Jacquin<sup>6</sup>, Nick A. R. Jones<sup>7</sup>, Sabine Kraus<sup>8</sup>, Amelia Munson<sup>9</sup>, Marcel Simsch<sup>8</sup>, Cassandra Scheibl<sup>10</sup>, Carmen Schwietz<sup>8</sup>, Helen Spence-Jones<sup>10</sup>, Maëlan Tomasek<sup>11</sup>, Camille A. Troisi<sup>12</sup>, A. Li Veiros<sup>13</sup>, Susanne R. K. Zajitschek<sup>14</sup> & Libor Závorka<sup>15</sup>

<sup>1</sup>IMEDEA-CSIC

<sup>2</sup>CCMAR

<sup>3</sup>Pennsylvania State University – Altoona

<sup>4</sup>Manchester Metropolitan University

<sup>5</sup>Siegen University

<sup>6</sup>Toulouse University

<sup>7</sup>University of Bayreuth

<sup>8</sup>Bielefeld University

<sup>9</sup>SLU

<sup>10</sup>Alfred-Wegener-Institut

<sup>11</sup>Clermont Auvergne University

<sup>12</sup>Ghent University

<sup>13</sup>University of St Andrews

<sup>14</sup>Liverpool John Moores University

<sup>15</sup>WasserCluster Lunz

When testing individuals under standardised conditions, individuals first need to be habituated to the testing conditions (i.e. new tank or enclosure) in which they will be observed for further behavioural or cognitive testing. However very little information is usually reported on the habituation protocols that lead to such tests, or how such habituation might impact subsequent behaviour during testing. Using a multi-lab collaboration we examine how the length of habituation trials influence fish behaviour, across a wide variety of species. In a between-individual design, fish had either (1) 3 habituation trials of 10 min each or (2) 3 habituation trials of 30 min each, where we measured changes in activity. Following habituation, we also conducted a novel object trial to examine how the different habituation conditions would influence individuals' latency to approach the object. Such a study will enable us to better understand the effect of habituation on behaviour and the propensity to engage in a new task, and whether this differs across a wide variety of species. This will ultimately raise attention to reporting and standardising habituation protocols.

## **Predator response in an urban world: behavioural interactions between vervet monkeys and domestic dogs**

Natacha Bande<sup>1</sup>, Stephanie Mercier<sup>2,3</sup>, Benjamin Robira<sup>2</sup> & Sofia Forss<sup>2,3</sup>

<sup>1</sup>University of Strasbourg, France

<sup>2</sup>Department of Evolutionary Biology and Environmental Studies, University of Zurich, Switzerland

<sup>3</sup>School of Life sciences, University of Kwazulu-Natal, South Africa

Urbanization confronts wild animals to evolutionary rapid levels of habitat transformations, including new predators. Non-human primates that live in proximity with humans, not only enter conflict potentials with human residents but also their domestic dogs. In this study we focused on vervet monkeys (*Chlorocebus pygerythrus*) - one of few primate species that have successfully adapted to anthropogenic disturbance, and their behavioural responses to domesticated dogs. Our study site, Simbithi Eco-Estate is home to multiple urbanized vervet monkey troops and around 1195 dogs. As such, we seized the unique opportunity at this site to shed light on primates' behavioural flexibility within the context of predator response. Our findings demonstrate that vervet monkeys perceive domestic dogs as threats yet show flexibility in responses compared to wild counterparts. Moreover, the rich abundance and variation among dog predators allowed us to identify cognitive perceptual capacities involved in predator responses. Here, our data show that vervet monkeys discriminate between certain characteristics encountered dogs, such as size or dog activity, and the distance separating the monkeys from the dogs at the time of interaction. Since animal urbanization has a strong biased focus on the re-sources driving adaptation, we here focus on the cost aspect of a nuisance species. Uncovering the relationship between these the two species will help us to identify the cognitive flexibility of vervet monkeys in the face of a potentially evolutionary new predator, but also to inform and implement better wildlife conflict management policies.

## **The impact of alternative reproductive tactics on the cognitive abilities of male wild house mice**

Anustup Bandyopadhyay<sup>1,2</sup> & Anja Guenther<sup>1</sup>

<sup>1</sup>Max Planck Institute for Evolutionary Biology, August-Thienemann-Str.2, 24306 Plön, Germany

<sup>2</sup>Ludwig-Maximilians-University of Munich, Großhaderner Str. 2 82152 Planegg-Martinsried, Germany

Alternative reproductive tactics describe the phenomenon that males of the same species can achieve reproductive success by following different strategies such as defending a territory to attract females or actively searching for receptive females without defending resources. Thus, it can lead to differences in intra-sexual competition and mate availability. Such differences might be navigated by a difference in emphasizing cognitive abilities. In this study, we investigated if different tactics can impact spatial learning and problem-solving in male wild house mice (*Mus musculus domesticus*) (N = 34), who are either territory holders or roamers. Preliminary data show that territorials were quicker to learn a maze task and that roamers were more persistent in problem-solving tasks. These results are in line with theory that predicts that territorials should have better spatial cognition to mate-guard or exclude intruders and that low-ranking roamers should be better problem-solvers due to otherwise limited access to resources. Overall, even though cognitive abilities remain difficult to interpret, disentangling their interplay with ecological relevance can be one way to understand within-species differences better.

## **Primate cognition in an anthropogenic landscape: using a mechanistic model to uncover problem-solving skills**

Paige Barnes<sup>1</sup>, Benjamin Robira<sup>1</sup>, Stephanie Mercier<sup>1,2</sup>, & Sofia Forss<sup>1,2</sup>

<sup>1</sup>Department of Evolutionary Biology and Environmental Studies, University of Zurich

<sup>2</sup>School of Life Sciences, University of KwaZulu-Natal, South Africa

Urbanization presents evolutionary novel challenges for many species, and we still know very little about how anthropogenic environments impact cognitive skills. Moreover, this line of research has so far been heavily biased towards studies on birds and small mammals. Here we present a study on urban cognition from the primate taxa. We explored problem-solving skills of semi-urban vervet monkeys, *Chlorocebus pygerythrus*, to shed light on this species' cognitive flexibility in an anthropogenic environment. Using a two-option puzzle box design with increasing levels of difficulty, we conducted 747 field experiments with two monkey troops (N=27) at the study site of Simbithi Eco-State, KZN in South Africa. First, we used mechanistic modelling to I) investigate whether more flexible monkeys were better at technical innovations and II) if the monkeys' anthropogenic experience is the best predictor of being a good innovator. In a second step, we examined whether semi-urban monkeys differ in their behavioural flexibility during problem-solving attempts compared to wild conspecifics (existing data from Inkawu Vervet Project) and to what extent social exposure were needed in the two environments for solving success. Our findings suggest that contrary to assumptions, an individual's task flexibility did not match its solving skills, and previous experiences with anthropogenic foraging did not predict monkeys' capabilities to solve novel challenges. All in all, our findings helps to uncover to what extent cognition is underlying adaptation of a primate species in urban environments.

## **Who is likely to cheat? Linking personality to deception in a gift-giving spider**

Narmin I. Beydizada<sup>1,2\*</sup>, Samuele Martini<sup>2</sup>, Michelle Beyer<sup>3</sup> & Cristina Tunì<sup>2\*</sup>

<sup>1</sup>Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská, 611 37 Brno, Czech Republic;

<sup>2</sup>Department of Life Sciences & Systems Biology, University of Turin, Via Accademia Albertina 13, 10123 Turin, Italy

<sup>3</sup>Faculty of Biology, Department II, Ludwig-Maximilians-Universität München, Großhaderner Str. 2-4, 82152 Planegg-Martinsried, Germany

When it comes to reproduction males and females rarely share identical biological imperatives, often leading to intersexual conflict. Males of the spider *Pisaura mirabilis* are known to cheat females into mating by offering silk-wrapped nuptial gifts of low nutritional values: alternative to prey, males offer prey remains or plant parts. Hypothetically, a cheating strategy must be a cost-effective option for a male to avoid costs of gift-giving (gift carrying, missed meal). Studies suggest ecological drivers to cheating, yet whether there is consistent individual variation in such male behaviour remains untested. Our study aims to ask whether cheating behaviour in male *Pisaura mirabilis* is part of a behavioural syndrome, with individual levels of aggression and boldness predicting the frequency of cheating in males. In our experiments, male spiders were screened for repeatable personality scores. With the presence of females, sexually stimulated males were then tested for the likelihood of accepting worthless prey for the nuptial gift. We hypothesize that aggressive males may perform better as hunters, investing more effort in mating by producing valuable gifts, while bolder males may engage in dishonest gift preparation due to “effortless”, “faster decision-makers”, and “risk-takers” traits. In this study, we show spiders were consistent in their personality traits, and the way they accepted worthless prey. We found male likelihood of accepting fake prey increased with aggression score but not with the boldness contrary to our hypothesis. We speculated the results from the point of opportunistic approach with the nature of aggressiveness as a strong competitive drive as well as a preferred mate partner by female which might potentially manifest deceptive tactics.



## **Scent marking as a social cue: Behavioral responses of free-ranging dogs to conspecific and heterospecific scents**

Sourabh Biswas<sup>1</sup>, Kalyan Ghosh<sup>1</sup>, Swarnali Ghosh<sup>2</sup>, Akash Biswas<sup>2</sup> & Anindita Bhadra<sup>1\*</sup>

<sup>1</sup>Behavior and Ecology Lab, Department of Biological Sciences, Indian Institute of Science Education and Research Kolkata, Mohanpur, West Bengal, India.

<sup>2</sup>Department of Biotechnology, Kalyani Mahavidyalaya, Mohanpur, West Bengal, India

Scent marking is a crucial form of communication in animals. This study investigated free-ranging dogs' ability to differentiate between scent marks of their own and neighboring groups, and how these scent marks influence territorial behavior and countermarking. The study also examined behavioral responses to scent marks from different group members and genders. A total of 297 trials were conducted on free-ranging dogs across 25 locations in Nadia and Bardhaman districts, India. Dogs were exposed to test cloths with scent marks or control cloths at various territorial locations. Scent marks from both within and outside the dogs' groups were presented near resource areas, resting sites, and boundaries. Behavioral responses were observed. Dogs exhibited stronger responses to scent marks than controls, with longer investigation times for neighboring group marks. Overmarking was prevalent in males, especially towards neighboring group scents. Territorial responses were higher for scent marks, with males showing stronger reactions. Behavioral patterns varied based on scent mark source and gender. Males showed distinct responses to same-group female scent marks, while both sexes reacted similarly to neighboring male scents. Female scent marks from neighboring groups elicited unique behavioral patterns. This study reveals complex scent marking behaviors in free-ranging dogs, highlighting its role in social dynamics and territoriality. Understanding these behaviors is crucial for managing dog populations and advancing knowledge on animal communication.

## **Towards an understanding of how particulate matter air pollution affects cognition in wild bees**

Biggin S, Price H, Tinsley M C & Martin-Ordas, G.

University of Stirling

Bees are one of the most important pollinators worldwide and have suffered severe population decline due to climate change, habitat loss, and intensive agricultural practices. Pollination depends on foraging, requiring cognitive abilities such as learning and memory. Recent lab research has shown pollutants (e.g., CO, NO, NO<sub>2</sub>) affect bees' olfactory system, and so their ability to successfully find flowers. We were interested in investigating particulate matter pollutants (e.g., PM<sub>1.0</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>) effect on wild bumblebees' and honeybees' learning abilities. Colour learning abilities were assessed in two different tasks. Bees were captured and tested in Stirlingshire in areas selected with differing pollution levels. We aimed at testing 450 bees across 30 different areas. We also collected data on bees' flower visitation in these locations. We predicted that, as atmospheric particulate matter increased, bee learning capabilities would decrease. We also predicted that the number of bees at a site would decrease as pollution increased. The implications of our findings are critical for identifying factors contributing to bee decline, and ultimately to improve our ecosystem health.

## **Exploring biases in the study of social animal migrations: a systematic literature review**

Iris D. Bontekoe<sup>1,2</sup>, Ellen O. Aikens<sup>1,2,3</sup>, Anna Schlicksupp<sup>1,2</sup>, Lara Blumenstiel<sup>1,2</sup>, Ricardo G. Honorato<sup>1,2</sup>, Isabel Jorzik<sup>1,2</sup> & Andrea Flack<sup>1,2</sup>

<sup>1</sup>Max Planck Institute of Animal Behavior, Germany

<sup>2</sup>University of Konstanz, Germany

<sup>3</sup>University of Wyoming, United States

Many animals behave in groups as this can come with benefits for individuals. Much research on sociality has focused on the consequences of sociality during foraging or fine-scale navigation. However, in recent years it has become clear that social influences are likely important during migrations as well, and an overview of past research is still missing. We performed a systematic literature review to provide an overview of the current state of research in the field of social animal migrations. We uncover biases in the addressed questions, study systems and locations, and taxonomic groups. Specifically, most studies have been carried out on birds in the northern hemisphere. Moreover, the majority of studies explored the influences of the short-term process of social information use on spatial decisions. We suggest that more research is needed to understand how social processes influence migration decisions. When studying social animal migrations, we recommend combining methods and approaches and using well-designed experiments.

## **Through an animal's eye: the implications of diverse sensory systems in scientific experimentation**

Joanna Brebner<sup>1</sup>, Maria Loconsole<sup>2,3</sup>, Daniel Hanley<sup>4</sup>, Vera Vasas<sup>5</sup>

<sup>1</sup>Research Centre on Animal Cognition (CRCA), CBI, Université Paul Sabatier, Toulouse III, France

<sup>2</sup>School of Biological and Behavioural Sciences, Queen Mary University of London, UK

<sup>3</sup>Department of General Psychology, University of Padova, Padova, IT

<sup>4</sup>Department of Biology, George Mason University, Fairfax, VA, USA

<sup>5</sup>School of Life Sciences, University of Sussex, Brighton, BN1 9RH, UK

‘Accounting for the sensory abilities of animals is critical in experimental design.’ No researcher would disagree with this statement, yet it is often the case that we inadvertently fall for anthropocentric biases and use ourselves as the reference point. We discuss the risks of adopting an anthropocentric view when working with non-human animals, and the unintended consequences this has on our experimental designs and results. To this aim, we explore general examples of anthropocentric bias from different fields of animal research, with a particular focus on animal cognition and behaviour, and lay out the potential consequences of adopting a human-based perspective.

## **The role of transgenerational maternal effects in the evolution of sociality in subsocial animals**

Georgia Cash, David Fisher & Callum McLean

The environment experienced by parents, particularly the mother, can significantly influence the traits and fitness of their offspring. These transgenerational effects can act to “prime” offspring to better cope with similar conditions – stress-induced traits and behaviours can be transmitted from parents to offspring, enhancing the offspring’s ability to survive and reproduce in environments with similar stressors. This may even drive evolutionary changes within populations, such as mothers who experience overcrowding or high competition having offspring that are more gregarious and less aggressive, traits which facilitate the evolution of social behaviour. I will study the role of transgenerational maternal effects in the evolution of sociality in the gregarious cockroach, *Blattella germanica*. Mothers were exposed to either an optimal or more arid humidity, constituting an environmental stressor, during gestation. Their offspring were then exposed to both humidity conditions and their behaviours (activity and exploration, as a proxy for tendency to disperse from the natal nest, and sociality) were recorded. Studies into the evolution of sociality have disproportionately focused on eusocial insects, so it is hoped that these results may shed further light on the environmental factors that promote the evolution of social behaviour in subsocial species.

## **Welfare integration as way of reducing bias in wild animal studies**

Janire Castellano Bueno<sup>1,2</sup> & Vittoria Elliott<sup>1,3</sup>

<sup>1</sup>Wild Animal Initiative

<sup>2</sup>Newcastle University

<sup>3</sup>Smithsonian Institution

Animal behaviour science frequently focuses on wild animals but often neglects individual welfare differences, despite the recognized link between welfare and behaviour. This oversight can introduce significant bias and reduce the reproducibility of research findings, contributing to replication issues in animal studies. The burgeoning field of Wild Animal Welfare Science (WAWS) highlights the importance of integrating welfare considerations into research methodologies to address these challenges.

Failing to account for individual variation and the past history of wild animals risks drawing inaccurate conclusions that may not be generalizable across populations or contexts. This not only undermines research reliability but also raises ethical concerns about the use of wild animals. As WAWS develops, there is a pressing need to incorporate welfare-based approaches that consider the unique experiences of each animal.

We present case studies demonstrating how integrating welfare considerations can reduce bias and improve study reproducibility. These examples showcase methods for assessing the welfare of free-ranging wild animals, leading to more reliable and generalizable outcomes. By emphasizing individual welfare, we aim to advance WAWS and promote a more comprehensive understanding of animal behaviour.

## **Why wait near your prey?'- Spatiotemporal strategies in collective hunting in social spiders *Stegodyphus dumicola***

Snata Chakraborty<sup>1</sup>, Etienne Lein<sup>2</sup> & Alex Jordan<sup>2</sup>

<sup>1</sup>University of Portsmouth

<sup>2</sup>Max Planck Institute of Animal Behavior

Prey attack probability is often associated with hunger state and personality types such that bold individuals respond to prey earlier than shy ones. Social spiders hunt collectively and follow a stop-and-wait motion when approaching prey. Live prey feeding trials in spider colonies in Namibia show differences in latency when attacking grasshoppers, flies, and ants. Attacks were fastest in flies, followed by grasshoppers and ants (a less likely prey item). Previous studies suggest early attackers spend more energy to subdue prey through extra-oral digestion but can also succeed in feeding longer. When compared across 1st and 2nd attackers, cumulative stop duration has a significant ( $p < 0.001$ ) combined effect from both prey type and rank of attack (1st to nth) in all 3 prey types. So when a spider stops before an attack, 1st attackers of hopper and fly wait longer than 2nd attackers. This higher latency of 1st attacker contradicts the expectation that bold individuals respond to and attack prey before others. We argue that social spiders practice different spatiotemporal strategies when collectively hunting different prey types to optimize energy expenditure and maximize individual food consumption. Thus, including individual differences in collective movement can break the confirmation bias posed by only personality trait-based studies of animal behavior.

### **Stress responses under extreme cold in bumblebees (*Bombus terrestris*)**

Mauro Chivite<sup>1,2</sup>, Yoorana Peyre<sup>2</sup>, Amaya Albalat<sup>2</sup> & Gema Martin-Ordas<sup>2</sup>

<sup>1</sup>Universidade de Vigo

<sup>2</sup>University of Stirling

Insects are not protected by animal welfare laws, although neural and behavioural evidence suggest that many species of insects might feel pain. Importantly, different guidelines—including ASAB guidelines—recommend minimizing any potential harm at any stage in animal research. Currently, the most used method to kill bumblebees for research purposes is to freeze them at -20 °C—which results in an estimated time to die of 2 hours. However, it is unknown if bees experience this exposure to extreme cold as stressful. Studies have shown clear physiological responses to stress stimuli such as vigorous shaking, a response that is driven by biogenic amines at the central nervous system. This process results in the modulation of physiological and behavioural mechanisms aimed at restoring individual homeostasis. Here we examined whether extreme cold was perceived by bumblebees as a stressor. To do so we compared the effect of a known stressor (shaking) with extreme cold (-20 °C) on the neuroendocrine stress response of bumblebees (n=80). In a second experiment (n=160), the effect of different anaesthetics on the response generated was evaluated, with the ultimate goal of establishing a humane method to kill bees in laboratory contexts. Our results have critical implications for animal welfare, in general, and for our understanding of insects' abilities to perceive stress, in particular.



## **Do they care who is there? Geckos adjust their behaviour towards familiar and unfamiliar handlers according to context**

Isabel Damas-Moreira<sup>1</sup>, Lauriane Bégué<sup>2</sup>, Eva Ringler<sup>2</sup> & Birgit Szabo<sup>2</sup>

<sup>1</sup>Behavioural Ecology, Faculty of Biology, Bielefeld University, Germany

<sup>2</sup>Division of Behavioural Ecology, Institute of Ecology and Evolution, University of Bern, Switzerland

Animals must integrate information to reduce uncertainty. The level of uncertainty influences how much animals rely on past experiences, but how uncertainty influences decision making in an experimental context is poorly understood. Animals' ability to recognize and behave differently towards individual humans can impact experimental results, increase error, decrease reproducibility and threaten scientific advancement. Therefore, it is essential to understand how and when experimenters influence animal behaviour. We tested captive Tokay geckos (*Gecko gecko*) ability to discriminate familiar and unfamiliar handlers across two situations: (1) when inducing tonic immobility (or death feigning), an antipredator behaviour in response to physical constraint, and (2) when feeding on live prey with tweezers (as during regular husbandry). A comparison of behaviour towards familiar and unfamiliar handlers showed differences in the feeding situation but not in the threatening situation. Our study reveals important insights into threat level specific decision making and an impact of handler identity on behavioural measurements, a factor that is rarely considered in experimental animal studies.

### **Foraging decisions of wild ravens in unfamiliar and unpredictable environments**

Silvia Damini<sup>\*1,2</sup>, Arnout Lindeman<sup>\*4</sup>, Petra Sumasgutner<sup>1,2</sup> & Thomas Bugnyar<sup>1,2,3</sup>

<sup>1</sup>Department of Behavioral & Cognitive Biology, Faculty of Life Sciences, University of Vienna

<sup>2</sup>Konrad Lorenz Research Center for Behavior and Cognition, Core Facility, Faculty of Life Sciences, University of Vienna

<sup>3</sup>Haidlhof Research Station, University of Vienna and University of Veterinary Medicine Vienna

<sup>4</sup>Behavioural Ecology Group, Wageningen University (\* Equal Contribution)

Ravens are scavengers that exploit resources provided by heterospecifics. This behavior can be advantageous in anthropogenic environments, that can be unfamiliar and unpredictable. To understand how wild ravens adapt to these environments, we investigated their scrounging strategies at a foraging site shared with a heterospecific (captive boars), and experimentally manipulated the degrees of familiarity and predictability of the foraging scenarios. Firstly, we provided a new, unfamiliar and unpredictable feeding site next to the established, familiar and predictable one. Secondly, as the new site became familiar, we introduced an unpredictable anthropogenic object near either site. Boars accessed all sites freely. More ravens were present and scrounged more often at the new site. This indicates that ravens use scrounging to mitigate risk at unfamiliar foraging sites. Moreover, ravens initially took longer to approach the new site, but this effect disappeared with familiarity. Importantly, approaches to both sites were dependent on the boar's behavior, highlighting the need to consider heterospecifics when studying scavenger behavior.

## **The influence of naturally neuroactive nectars on bee cognition**

Anna Dorling

University of Oxford

Bees feed on floral nectar, and are exceptionally capable of learning to find, collect and store it. In turn, plants may gain reproductive benefit from conspecific pollen transfer. Some plants express drugs in their nectar (such as caffeine and nicotine) which could change the way nectar rewards are perceived, perhaps therefore influencing foraging decisions and thus plant reproductive success. In this poster I would present evidence from two of my PhD experiments to show that (i) these drugs can modify long term floral memory in bees, (ii) drugged nectar can enhance learning in a pre-exposure-dependent way, and (iii) individual bees may differ in their propensity to develop and express addictive behaviours. Previous techniques of assaying feeding choice behaviour in bees were developed in nutritive paradigms which rely on averaging across populations, and therefore hadn't captured these bimodal responses.

## **Energetic expenditure of nest building in zebra finches**

Laura J. Douglas & Susan D. Healy

University of St Andrews

Scientific research is built on that which has come before, but we must examine where that knowledge comes from and if there is a basis for these claims. In the study of avian behaviour and reproduction many assert that nest building is a costly activity. However, there has been no study to prove that nest building itself is costly. I carried out a study with two pairs of zebra finches to test a method of measuring mass loss in the birds as an indicator of energy expenditure. This was in tandem with behavioural recordings which identified any changes in feeding behaviour which may indicate reasons for mass loss or indicate energy demands. In this study I found an average 1g loss in male birds during the building period that was not seen in the females which do not contribute to nest building. This finding potentially shows the first support for the assumption that nest building is a costly activity. Through re-examination of such long held assumptions we can either correct these ideas or validate the findings and the research which has built upon them.

## **The bold and the bald: Boldness in hermit crabs is associated with an increase in chelar sensory armaments**

Ari Drummond & Mark Briffa

University of Plymouth

Hermit crabs use their chelipeds for a variety of functions, including locomotion, foraging, shell assessment, and communication, behavioural processes reliant on sensation and information gathering. Chelipeds are frequently ornamented with structures that assist information acquisition, including sensilla. While sensilla are an essential component of sensory processes in crustaceans, studies of sensillar functional morphology are largely restricted to in situ neurophysiological examination of prepared tissue and behavioural studies on stimulus-response patterns. While both chelar and sensillar morphology have been described in many crustaceans, patterns of chelar sensillation have not. Furthermore, the relationships between patterns of sensillation, the use of chelar sensilla in information gathering and associated behavioural outcomes have not been examined. We sought to determine if patterns of chelar sensillation and sensillar abundance correlate with a well-studied behavioural outcome used to assess animal personality--startle response duration (SRD)--in a popular model species, the common hermit crab *Pagurus bernhardus*. If chelar sensilla aid in information gathering and risk assessment, more sensilla should be correlated with shorter SRDs (i.e., bolder crabs). We filmed the startle response of 60 hermit crabs once daily for 8 days. Hermit crabs were then housed until moulting, at which time the crabs' chelar moults were collected and prepared for SEM imaging. Scans of the exterior and interior of both chelar moults were taken and assessed by morphometric analysis. Within and between individual differences in SRD were examined and correlated with chelar sensillar distribution and abundance. We found that hermit crabs differ in their startle responses and the abundance and distribution of chelar sensilla. Furthermore, hermit crabs with a higher abundance of sensilla had shorter SRDs. Our findings suggest that organisms with a greater armament of sensory structures may have better access to environmental information, facilitating decision-making and altering behavioural outcomes that distinguish between animal personality types.

**Do horses use human pointing and a wooden marker as discriminative cues? A replication of Proops et al. (2010).**

Ivana Dumičić<sup>1</sup> & Ljerka Ostojić<sup>1,2,3</sup>

<sup>1</sup>Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, Croatia

<sup>2</sup>Division of Cognitive Sciences, Faculty of Humanities and Social Sciences, University of Rijeka, Rijeka, Croatia

<sup>3</sup>Centre for Mind and Behaviour, University of Rijeka, Rijeka, Croatia

Several animal species have been reported to be able to follow human gestures like gazing or pointing to find hidden food, most notably apes and dogs. Research with horses has so far showed mixed results: in some studies horses successfully chose locations at which a human was pointing, while other studies suggest that this ability may be less sophisticated than in dogs. In terms of using relatively novel, physical cues, horses have been reported to, like dogs but unlike apes, be similarly or only slightly less successful than with human pointing cues. However, the epistemic value of cross-species comparisons may still be limited if the effects found within a species cannot be considered reliable. Thus, the aim of this project was to replicate the study by Proops and colleagues (2010) in which the authors compared horses' ability to use human pointing and a wooden marker as predictive cues of a rewarded location. We tested 20 horses in a within-subject design following the procedure used by Proops et al. (2010) with some minor methodological changes. We will present the results and discuss them from the perspective of replications in animal behaviour and cognition.

## **Influence of an urbanized environment on the diet of wild vervet monkeys assessed by DNA metabarcoding of faecal samples**

Joey Felsch<sup>1</sup>, Eduard Mas-Carriò<sup>1</sup>, Stéphanie Mercier<sup>2</sup>, Judith Schneider<sup>1</sup>, Sofia Forss<sup>2</sup>, Erica van de Waal<sup>1</sup> & Luca Fumagalli<sup>1</sup>

<sup>1</sup>Department of Ecology and Evolution, University of Lausanne

<sup>2</sup>Department of Evolutionary Biology and Environmental Studies, University of Zurich

Foraging decisions in vervet monkeys (*Chlorocebus pygerythrus*) may be affected by social transmission of information between individuals in a group, and more specifically between mother and offspring. Due to increasing habitat fragmentation and conversion, the range of vervet monkeys in urban areas has widened considerably, potentially leading to the presence of anthropogenic food in their diet. Due to their generalist and opportunistic feeding behaviour, studying urban vervet monkeys' diet is important to help understanding the impact of urban ecosystems on their foraging behaviours. However, accurately determining the variety of food types consumed by omnivorous species may in cases be complicated by mere observations. Consequently, environmental DNA (eDNA) based techniques provide complementary study options that can result in more complete assessments. In this study, we determined urban vervet monkeys' dietary components using DNA metabarcoding of faecal samples. 448 samples were analysed from 2 different monkey groups of respectively 23 and 21 individuals, collected during a 4-month period in an eco-estate in South Africa. We aim to define the amount of natural food versus human food ingested, and to compare diet variability between the two groups of monkeys, as well as between different sex-age classes, especially between mother and offspring. We assess if dietary patterns have been socially transmitted, and whether this is distinguishable at matrilineal and intergroup levels.

## **Do too many analysts spoil zoo research?**

Marianne Sarah Freeman<sup>1</sup> & Paul Rose<sup>1,2</sup>

<sup>1</sup>University Centre Sparsholt

<sup>2</sup>University of Exeter

Significant variation in the results of complex data have been noted in general data analysis fields and with data analysis methods becoming more transparent within publications this is likely to be observed more widely in the future. Zoo research publications currently do not encourage or offer facilities to upload the analysis scripts and from literature searches there are a variety of approaches that have been used to analyse the data, even for the more standard research designs. A tried and tested approach to choosing and using statistics is common, with researchers opting for data analysis methods that have been undertaken in similar publications but this may not necessarily be the best option and the handling of data clean up, preparation and calculations are not always clear. Crowdsourcing researchers through subject specific networks has helped to gather wider data which can be collectively analysed. Using a similar strategy, networks can provide researchers or research teams, as participants in data analysis focused research, to simultaneously investigate the same research question. Here we highlight a many analyst approach that will highlight the most commonly used data preparation and analysis methods in captive behaviour studies using a standardised data set to answer set questions. We hope to assess how subjective, analytic choices may influence research results and elucidate how robust zoo research methods and their findings are.



### **Soundscapes and songs: acoustic analysis with great apes**

Fiona French<sup>1</sup>, Steve Good<sup>1</sup>, Karim Mokaddem<sup>1</sup>, Kat Finch<sup>2</sup> & Naomi Frost<sup>2</sup>

<sup>1</sup>London Metropolitan University

<sup>2</sup>Twycross Zoo

This project investigates both the auditory capabilities of great apes and the environmental acoustics around zoo-housed ape enclosures, to identify sources of noise at frequencies and volumes imperceptible to humans. Humans have evolved to hear the sounds that we produce orally, enabling sophisticated appreciation of human vocal signals and also human music, which uses the harmonics present in the human voice. Meanwhile, many other species have evolved to be able to communicate with their conspecifics, using multimodal signals. Great ape vocal utterances often vary in pitch, timbre and volume from those produced by humans, so their perception of sound may be completely different from ours. There is still much to learn about other species' perceptive capabilities, and in this project, we are using passive acoustic monitoring to learn more about subjective soundscapes from the perspectives of different animals in human care. We report on the results from a series of tests where we have captured and analysed social auditory signalling and environmental acoustics in and around great ape enclosures, demonstrating how these results can inform spatial design and scheduling of events in zoos. The presentation includes video and audio material.

## **Investigating the effects of reciprocity and individual differences in shaping trophallaxis networks in honeybees**

Michael J.M. Gachomba<sup>1</sup> & Jennifer L. Cook<sup>2</sup>

<sup>1</sup>School of Psychology, University of Birmingham, Birmingham, United Kingdom

<sup>2</sup>Centre for Human Brain Health and School of Psychology, University of Birmingham, Birmingham, United Kingdom

Trophallaxis, the mouth-to-mouth transfer of nutrients and other fluids from one individual to another, is a pervasive behavior in eusocial insects, being essential for sharing food and social information as well as mediating the spread of diseases. Whereas previous research has highlighted the relevance of this social interaction for social cohesion and survival, little is still known about the factors underlying the formation and structure of trophallaxis networks. Here, we asked if trophallaxis exchanges in honeybees (*Apis mellifera*) are shaped by reciprocity and individual differences in behavior. To this aim, we leveraged data from colonies with hundreds of individuals, and combined behavioral analysis with statistical modelling of social networks, while controlling for observation time. Although direct reciprocity had a marginal effect, we found strong evidence for generalized reciprocity, with honeybees that donated fluid to others being more likely to receive from others. Moreover, bee's movement patterns inside the hive influenced the likelihood of forming ties. Our results point to the principle of reciprocation and to behavioral characteristics of the individual as important factors in modulating trophallaxis interactions in honeybees.

# **Odd-item search using computer-controlled touchscreen tasks in domestic goats (*Capra aegagrus hircus*): a pilot study**

Jie Gao<sup>1</sup>, Yumi Yamanashi<sup>1,2</sup> & Masayuki Tanaka<sup>1,2</sup>

<sup>1</sup>Kyoto University

<sup>2</sup>Kyoto City Zoo

Domestic goats, as land mammals, are an important part during evolution. Studying their cognition will help understand the evolution of animal minds from a boarder perspective as well as elucidate the effect of domestication. In order to conduct more controlled and objective cognitive tests, we aim to adopt a computer-controlled touchscreen testing system for goats. We successfully trained three domestic goats to use a 23.8-inch touchscreen, and did a pilot study using the odd-item search paradigm to see if they could complete the visual shape discrimination in this experimental setting. They were first familiarized with touching the target, a black circle, which appeared in one of the six fixed places on the screen. Then, they were tested in odd-item search tasks, with the distractor being a black triangle. They received 24 test trials for each condition, with distractor numbers being 1, 2, 3, 4, and 5. They performed better than the chance level when the distractor numbers were bigger than 1 (for two goats) and 2 (for one goat) respectively. The results suggested that they can complete the visual discrimination, especially when the distractor number is bigger. This study provides a novel method and paradigm for behavioral training and cognitive testing in goats and potentially other ungulates. We hope this could inspire future research using computer-controlled tests with these species.

## **Exploration and Foraging Behavior: A field validation with Neophilia test**

Jefferson García-Loor<sup>1,2</sup>, Andrew C. Katsis<sup>1,2,3</sup>, Lauren K. Common<sup>1,2,3</sup> & Sonia Kleindorfer<sup>1,2,3</sup>

<sup>1</sup>Department of Behavioral and Cognitive Biology, University of Vienna, 1030, Austria

<sup>2</sup>Konrad Lorenz Research Center for Behavior and Cognition, University of Vienna, 4645, Austria

<sup>3</sup>College of Science and Engineering, Flinders University, Adelaide, 5001, Australia

According to the neophobia threshold hypothesis, species with greater dietary specialization should be more exploratory. Few studies have measured the repeatability of exploration behavior of individually marked animals in the wild, so we lack a robust test of the neophobia threshold hypothesis. We tested this hypothesis in Darwin's finches in a species assemblage renowned for its foraging diversity. First, we tested for intra-individual consistency in exploration behavior in color-banded birds tested in short-term captivity in a novel arena and later again, in the wild tested using a novel object. Second, at the species level, we compared foraging diversity calculated using the Shannon Diversity Index against the average exploration score per species. Our results confirmed that both measures of exploration behavior were significantly correlated within individuals across context and time. In support of the neophobia threshold hypothesis, more exploratory species also had a broader foraging niche breadth. Also, as predicted generalist species were more explorative. These findings add to our understanding of how individual differences in exploration behavior may be associated with population-level differences in foraging behavior. From a conservation management perspective, such insights may be important when planning translocation programs with a view to consider prevailing resource distribution and individual foraging and exploration phenotypes.

## **Finding nemo's sounds: Classifying acoustic communication of orange clown anemonefish through deep learning**

Lucy Emma Garden

Newcastle University

Orange Clown Anemonefish (*Amphiprion percula*) communicate by means of purposed sounds, and these sounds play a vital role in the upkeep of their social hierarchy, among other ends. Classically, these sounds have been analysed via manual methods, but this can be slow as well as prone to human bias. Increasingly, however, machine learning is being explored as a potential method for furthering the study of vocalisations by living beings. This project aimed to create a machine learning based tool to aid researchers in their research of *A. percula*. A set of machine learning models were created to classify *A. percula* sounds, one for each of three problems: breeding status, group size, and reef. A dataset collected in Papua New Guinea was used to train the models, which achieved accuracies of 96%, 92% and 73% respectively for the stated problems. An app was created to allow researchers to use the models, which displays analysis of input data to the user. This research provides evidence that machine learning is a valid method for the classification of *A. percula* sounds, and that researchers could use machine learning to generate insights into animal sounds rapidly and without human bias.

## Investigating context-specific advantages of depression-like behaviour in wild-type zebrafish (*Danio rerio*)

Arpita Ghosh<sup>1\*</sup>, Aakash Madhav Rao<sup>3</sup>, Prarthna Middha<sup>1</sup>, Shambhavi Rai<sup>1</sup> & Bittu Kaveri Rajaraman<sup>1,2\*</sup>

<sup>1</sup>Department of Psychology, Ashoka University, Haryana, India

<sup>2</sup>Department of Biology, Ashoka University, Haryana, India

<sup>3</sup>Department of Computer Science, Ashoka University, Haryana, India

(\* Equal Contribution)

Depression is one of the most common mental health conditions diagnosed worldwide. While most investigations have focused on the detrimental aspects of depression, there is an apparent dearth of literature examining the possibly advantageous or non-detrimental aspects of depressive behaviors. Our aim was to identify parameters relevant for understanding the potential advantages of context-specific depressive behaviors, leading to reduced energy expenditure. We examined metabolic, social and movement correlates of depression-like behavior in wild-type zebrafish to investigate parameters relevant for examining context specific advantages of depressive behavior, using social isolation. Each fish was socially isolated in minimally-translucent tanks containing embryo water solution, to prevent exposure to conspecific visual or olfactory cues, for 1 month. Social isolation produced a decrease in metabolic ( $p < 0.05$ ,  $d = -0.555$ ) and movement rates ( $p < 0.05$ ,  $d = 0.677$ ), and a reduction in social preference ( $p < 0.05$ ,  $d = 1.009$ ). These changes after social isolation could be contextually beneficial for the fish in environments where there is high availability of food and high predatory threat. This study opens a range of possibilities to explore various ecological frameworks in which depression-like traits could be of adaptive significance.

## **Developing an apparatus to investigate prosocial behaviour in laying hens housed in commercial conditions**

Rebecca Grut<sup>1</sup>, Michael J. Toscano<sup>2</sup>, Jean-Loup Rault<sup>3</sup>, Julie M. Collet<sup>4</sup> & Maria Vilain Rørvang<sup>1</sup>

<sup>1</sup>Swedish University of Agricultural Sciences (SLU), Dept. Biosystems and Technology, 234 22 Lomma, Sweden

<sup>2</sup>ZTHZ, Division of Animal Welfare, VPH Institute, University of Bern, 3052 Zollikofen, Switzerland

<sup>3</sup>Institute of Animal Welfare Science, University of Veterinary Medicine Vienna, Vienna, Austria

<sup>4</sup>INRAE, Université de Tours, BOA, 37380 Nouzilly, France

Prosocial behaviour, as actions that benefit others, has been explored in many species using various test paradigms, but evidence in laying hens is sparse. This study aimed to develop an apparatus to test for prosocial behaviour in laying hens kept in groups (n=225) within their home aviary. The apparatus was based on biologically relevant behavioural aspects, and we sought to determine if hens could learn to use the apparatus, and if so, if they showed evidence of prosocial motivation. The apparatus was designed like a seesaw with a perch platform on one end and a reward (grapes) hidden under a lid on the other. When a hen perched, the platform lowered, causing the lid to rise and the reward was accessible. An identical control apparatus, without a reward, was placed next to the test apparatus. Both apparatuses were equipped with RFID antennas, and all hens wore individual leg-mounted transponders detected by the RFID while using the apparatus, allowing us to record the role of each individual while testing in groups. We discussed potential improvements to reduce observer and selection biases, e.g. including blinded observers, different groups and inter-rater reliability tests.

## **Coordination of care reduces conflict and predation risk in a cooperative breeding bird**

Chay Halliwell<sup>1</sup>, Andrew Beckerman<sup>1</sup>, Samantha Patrick<sup>2</sup>, & Ben Hatchwell<sup>1</sup>

<sup>1</sup>University of Sheffield

<sup>2</sup>University of Liverpool

When two or more individuals cooperate to provision a shared brood, each carer may be able to maximize their payoffs by coordinating provisioning in relation to what others are doing. This investment ‘game’ is not simply a matter of how much to invest, but also of the relative timing of investment. Recent studies propose that temporal coordination of care in the forms of alternation (i.e. turn-taking) and synchrony (i.e. provisioning together) function to mitigate conflict between carers and reduce brood predation risk, respectively. Such coordination is widespread, yet its fitness consequences have rarely been explored. We use a long-term study of long-tailed tits *Aegithalos caudatus*, a cooperatively breeding bird with coordinated care, to test hypotheses for turn-taking and synchrony of provisioning visits. First, we find support for the hypothesis that turn-taking mitigates conflict between carers because, in cooperative groups, provisioning rates and offspring recruitment increased with the level of alternation. Secondly, our results support the hypothesis that synchronous nest visits reduce nest conspicuousness and the risk of nest predation, especially when provisioning rates are high. We conclude that alternation and synchrony both confer fitness benefits on carers, and despite being intrinsically linked, they appear to serve independent functions.



## **Comparing observational and experimental approaches to studying reptile cognition**

Katy Hartley, Beth A Ventura & Anna Wilkinson

University of Lincoln

The majority of research investigating reptile social cognition has been experimental, when successful this work provides crucial evidence which can indicate ability and mechanism. However, when positive results are not observed, it is challenging to know why. It is therefore essential to assess these phenomena under natural living conditions. In experimental conditions there is evidence that red-footed tortoises can follow the gaze of a conspecific, however, a series of experiments found that they did not yawn contagiously when observing another yawn. Our study sought to assess whether these phenomena occur under natural captive living conditions. The behaviour of 28 captive red-footed tortoises (varied ages and sexes) was observed. We analysed video footage of the home environment collected over a year, and assessed evidence of contagious yawning - the number of yawns followed by a responding yawn (indicating yawn contagion) compared to yawns where observed animals did not see the eliciting yawn (control). Videos were also analysed to assess evidence of both gaze following into the distance (an individual aligns its gaze to that of another) and geometric gaze following (an individual observes a point in space behind a barrier not visible to another, and a conspecific alters its position to observe what is being gazed at). Data analysis is ongoing, but preliminary findings suggest that whilst contagious yawning has not yet been observed, the species does appear to follow the gaze of another individual, suggesting at this stage, experimental work is a valid measure of natural behaviour in the captive environment.

### **Behaviour as indicator of physical tiredness in horses**

Noémie Hennes, Christine Briant, Camille Lorcet, Alice Ruet & Léa Lansade  
INRAE, CNRS, Université de Tours, PRC, 37380, Nouzilly, France

Both behaviour and physiology are affected by physical activity and particularly intense exercise. Indeed, while physiological measures are commonly used to assess animal response to exercise, behavioural responses may also be a useful indicator. The objectives of this study were to investigate i) the effects of exercise on behaviours and head positions on the days following an intense exercise; and ii) whether behaviours during exercise can predict horse behaviours the days after exercise. Nineteen horses were observed on the day preceding and on the two days following an intense exercise session. The results demonstrated that horses exhibited longer periods of rest and with a head position below the withers, as well as shorter eating durations, following the exercise session when compared to the pre-exercise baseline. The occurrence of behaviours associated with discomfort (head conflict behaviours, nose behind the vertical, and open mouth) appeared to predict the durations of resting, head below the withers, and eating. This study suggests a novel combination of behavioural indicators of physical tiredness in horses that may provide a more comprehensive description of the horse's response to exercise.

## **Impacts of habituation and tolerance of observers on behavioural data collection**

Russell A Hill, Katarzyna, Nowak<sup>2</sup>, Laura R. LaBarge<sup>3</sup> & Andrew T. L. Allan<sup>1</sup>

<sup>1</sup>Durham University, UK

<sup>2</sup>Białowieża Geobotanical Station, Poland

<sup>3</sup>Max Planck Institute of Animal Behavior, Germany

Observational studies of behaviour, particularly on primates, have relied on habituation, the process where wild animals learn to accept researchers as ‘neutral’ elements of their environment. Despite being highlighted in the STRANGE framework, however, this assumption of neutrality is rarely tested. Drawing on primate case studies from the Soutpansberg Mountains, South Africa, we suggest observer effects could be significant and undermine interpretations, even after years of observation. Samango monkeys exploited experimental food patches in high-risk strata more intensively when researchers were present, suggesting observers acted as shields against terrestrial predators. Physiological responses to predator encounters also declined as observer number increased. Chacma baboons displayed consistent, but individually distinct, responses to flight initiation distance approaches by observers suggesting a tolerance trait, with individual tolerance differences impacting social networks measured through behavioural sampling. Collectively these findings suggest complex interactions between observer presence and animal behaviour that could challenge the robustness of research findings.

**Effects of varied photo-period durations and Red Korean Ginseng extract supplementation on growth performance, feed efficiency, and health status in New Zealand White Rabbits**

Syeda Maryam Hussain, Evelyn Saba, Usman Rashid, Mansoor Abdullah, Aayesha Riaz, Muhammad Fiaz, Farooq Iqbal & Zahid Manzoor

A total of 36 New Zealand White rabbits, aged six weeks were kept at the animal house of PMAS-UAAR for 42 days and divided into 04 groups (T1 (Control), T2(200 mg/Kg Body weight), T3 (300 mg/Kg Body weight), T4 (300 mg/Kg Body weight) Red Korean ginseng extracts)). Animals were dewormed before the start of the experiment. The second factor of the experiment was lightning regimes (L1- Normal daylight length hours and L2= 19 hours). Sampling was done for growth performance, carcass properties and etiology for rabbit's performance and behaviour and sampling was done on day 0, day 21 and day 42. The mean higher live body weight (1.273 Kgs), higher feed intake (38.47 gms) and higher feed conversion ratio(3.25) was noticed in T4, while the lowest occurred in control (1.215 kg, 26.65 gms, and 4.78). The highest growth rate was noted in T4, the mean carcass weight was higher in control (5.35), and the lowest was in T3 (4.17). The rabbit fur quality, comfort factor and fur diameter were higher in T2 under L1, but the spin fineness and medulations were higher under T4 with L2. The drip loss of rabbit meat was higher in the control group and lowest in T3. The cooking loss of rabbit meat was higher in T2 (22.76) and the lowest in T3 (18.59). The T4 rabbits showed aggression and less efficiency while the T2 showed friendly social behaviour with good instincts. The RKGE supplementation of 200 mg improves the performance and etiology in NZW rabbits, whereas the 300 mg RKGE significantly increases the weight gain in rabbits under normal light but in case of lighting increases the animal fur, hairs, and weight was significantly ( $P= 0.082$ ) affected. Overall, the 19 hours of light exposure disturbed the overall behaviour of rabbits and animals were more focused on feeding and grooming rather than resting. Rabbit feeding behaviour in 19-hour treatments gets compromised along with the collective negative effect on weight gain, and carcass weight.

## **Associations between song features and neighbourhood in the social network of a wild passerine**

Mónika Jablonszky<sup>1,2</sup>, Miklós Laczi<sup>2,3</sup>, Gergely Nagy<sup>1</sup>, Zoltán Tóth<sup>4</sup>; Sándor Zsebők<sup>1,2</sup> & László Zsolt Garamszegi<sup>1</sup>

<sup>1</sup>Evolutionary Ecology Research Group, Institute of Ecology and Botany, HUN-REN Centre for Ecological Research, Vácrátót, Hungary;

<sup>2</sup>Behavioural Ecology Group, Department of Systematic Zoology and Ecology, ELTE Eötvös Loránd University, Budapest, Hungary;

<sup>3</sup>HUN-REN-ELTE-MTM Integrative Ecology Research Group, Budapest, Hungary;

<sup>4</sup>Department of Zoology, Plant Protection Institute, HUN-REN Centre for Agricultural Research, Budapest, Hungary

The position in social networks influences the success of individuals in many animal species. However, the links between bird song and social networks remained understudied. Such associations are expected as neighbours can learn song elements from each other or change their songs due to competition and also because songs can be related to other individual traits determining social network positions. We investigated these phenomena in males of the collared flycatcher (*Ficedula albicollis*), a territorial passerine with complex songs. Relying on long-term data, we used multiple traits reflecting the spectral- and temporal characteristics and complexity of songs to investigate if similarity in song is associated with the position in neighbour networks (related to the spatial position of singing territorial males). We found that the minimum frequency and repertoire size of neighbours' songs were more different than expected by chance. Our finding that neighbours tend to sing differently with respect to some song traits suggests that such communication traits and social environment should be studied together. In this way, we can control for the potential confounding effect of the social environment when exploring the relationships between song traits and other behavioural or environmental variables.

## **Do Asian elephants (*Elephas maximus*) wait for a larger food reward in a delay of gratification task?**

Hoi-Lam Jim<sup>1</sup>, Joshua M. Plotnik<sup>2</sup>, Shinya Yamamoto<sup>1</sup>

<sup>1</sup>Kyoto University

<sup>2</sup>Hunter College - City University of New York

Delay of gratification has been studied across species to understand its links to advanced cognitive abilities. Elephants are an interesting taxon for this research, as several hypotheses suggest they might delay gratification due to their large body and brain size and complex social structures – traits seen in other species that wait for higher-quality rewards. However, as generalist and opportunistic feeders, elephants may favour immediate rewards over delayed ones. We tested six captive female Asian elephants (*Elephas maximus*) in an intertemporal choice task to examine whether they would prefer a sooner, smaller reward or a later, larger reward, with wait times increasing incrementally from 2 to 4, 8, 13, and 18 seconds. In the experimental condition, rewards differed by a 1:4 quantity ratio, whereas in the control condition, rewards were equal. Preliminary results showed that three elephants waited the full 18 seconds for the larger reward, two waited only 2 seconds, and one did not wait at all. This study contributes to our understanding of elephant cognition and adds to comparative research on self-control in nonhuman animals.

### **Living with the invader: The impact of alien invasive mosquitofish on native killifish behaviour**

Ioannis Leris\*, Nicholas Koutsikos, Leonidas Vardakas, Alexandros Ntakos, Sofia Laschou, Petros Kouraklis & Eleni Kalogianni

Institute of Marine Biological Resources and Inland Waters, Hellenic Centre for Marine Research (HCMR), 46.7 km Athens-Sounio ave., 19013 Anavyssos, Attica, Greece.

The Corfu killifish, *Valencia letourneuxi*, is a critically endangered freshwater fish of Western Greece and Southern Albania. Its populations are in sharp decline due to habitat degradation and to impacts of the alien Eastern mosquitofish, *Gambusia holbrooki*. Aiming to examine how invader presence influences native fish behaviour, we conducted a field experiment at a Northern Corfu river, comparing the behaviour of killifish co-existing with the mosquitofish to that of killifish naïve to the invader, in the same aquatic system. Individuals were tested in three consecutive behavioural tasks, i.e. an emergence, an open field and a sociability test. Killifish co-existing with mosquitofish, were shyer, less exploratory, less social, and exhibited more stress-related behaviours, than killifish naïve to the mosquitofish. Our findings are an important first step towards understanding the role of behavioural mechanisms in the decline of native fish populations after alien species invasion. Furthermore, these effects may represent a “canary in the coal mine”, i.e. an alternative early warning indicator of alien invasion impacts for rapid conservation intervention.

### **Wistar rats exhibit individual differences in ultrasonic vocalisations in response to playful handling (tickling)**

Louise Kandler, Sarah Brown, Alistair Lawrence, Vincent Bombail.

Royal (Dick) School of Veterinary Studies, Roslin Institute and Scotland's Rural College, Edinburgh, UK

Laboratory rats are a powerful model in preclinical research, considered to be homogeneous across time and facilities. We and others have consistently identified 14 different types of ultrasonic vocalisations (USV) at a frequency around 50 kHz, known to be associated with positive affective states. Rat tickling (or playful handling) is a heterospecific interaction between an experimenter's hand and a rat, known to induce positive emotions.

We performed 3 playful handling sessions in 16 juvenile male Wistar rats, then 4 months later over 3 more sessions in the same adult individuals, to investigate USV production over time.

USV emitted in response to playful handling were categorised, based on their acoustic properties. We performed analyses using Spearman's Rank Correlation Coefficient and Kendall's coefficient of concordance. We describe persistent individual differences in both the number and type of USV rats produce over time and identified the existence of high- and low-vocalisers, who consistently express distinct types of USV.

Even the supposedly homogeneous laboratory rats respond to playful interactions with personal preferences. We propose recording rat USV offers a non-invasive window into the mind of the rat experiencing play-induced positive affective states. Understanding variability in rat USV response might allow to characterise phenotypic diversity and refine laboratory experiments.



## **A bias in budgets: inferring welfare from behavioural comparisons in the wild and the zoo**

Robert Kelly<sup>1</sup>, Lisa Leaver<sup>1</sup> & Paul Rose<sup>1,2</sup>

<sup>1</sup>Centre for Research in Animal Behaviour, Psychology, University of Exeter,

<sup>2</sup>WWT, Slimbridge Wetland Centre

Natural behaviour performance in captive animals is traditionally measured to infer welfare states, with an increase in natural behaviour associated with positive welfare. Captive environments, including zoos strive to replicate ecologically-relevant environments that promote species-specific behaviour performance. Comparing wild baseline time-activity budgets with zoo conspecifics can be used to verify behavioural and ecological differences in captive contexts. Some species struggle to adapt and cope in captive environments, with increased abnormal behaviour performance and subsequent reduced welfare. Conversely, some groups of animals may adapt to captivity through development of novel behaviours which do not compromise welfare. However, research into baseline activity of species in both wild and captive contexts is skewed towards non-human primates and charismatic mammals, with many species of birds and reptiles underrepresented. The main aim of this review was to determine whether behaviours indicative of positive welfare states are performed by zoo animals grouped by taxonomic Order. Effect sizes were calculated to analyse differences between behavioural categories in wild and zoo species. Abnormal behaviour was common in the zoo and replaced reproductive and foraging behaviours in wild species, although taxonomic diversity across Orders warrants further research. Overall, the prevalence of abnormal behaviour in zoo animals suggests a struggle to adapt, indicating reduced welfare states. However, a paucity of research in baseline activity in wild and captive contexts suggests further research is needed to validate these findings across species.

## Activity budget of captive spotted hyenas at zoo Planckendael

Foozhan Kheradmand<sup>1,2</sup>, Ehsan Saeidi<sup>1, 2</sup> & Marina Salas<sup>2</sup>

<sup>1</sup>Department of Veterinary Medicine, University of Sassari, Sassari, Italy

<sup>2</sup>Antwerp Zoo Centre for Research and Conservation, Royal Zoological Society of Antwerp, Antwerp, Belgium

Spotted hyenas (*Crocuta crocuta*), as highly gregarious and nocturnal carnivores, spend the majority of their daylight hours in social resting. Studying the behavior of these animals requires careful consideration of ethograms, as variations in these can lead to inconsistent observations and misinterpretations. Additionally, researcher biases and assumptions can significantly affect the documentation of observed behaviors. At Zoo Planckendael in Belgium, a group of spotted hyenas consisted of three adult females (ages 14, 2, and 2), a 10-year-old male, and a 2-month-old female cub. The oldest female, Luena, is the mother of the two younger females, Xena and Xavannah, as well as the cub, Zahara. The male, Bongo, is their father. Their enclosure spans two connected outdoor areas covering 2100 m<sup>2</sup>, with natural substrates such as grass and trees, a pond, a central den, and an indoor space of 35 m<sup>2</sup> divided into seven stables. Over 21 days in May-June 2024, 211.34 hours of observation were recorded over 30 sessions of 10 minutes each per day. Data were recorded using ZooMonitor (version 5.1.3, Lincoln Park Zoo) and analyzed using comparative means in IBM SPSS Statistics, version 27. The observed behaviors were tallied, revealing social resting as the most frequently observed behavior (39.4%), followed by resting (18.2%), staying out of sight indoors (8.6%), alertness (7%), walking (5.9%), exploring (5%), standing (4.2%), and nursing and caregiving (3.5%). Combined, resting (social resting + resting alone) constituted 57.6% of the observed time. Previous studies indicate that wild spotted hyenas spend 69-70.7% of their time resting or inactive, while captive spotted hyenas rest even more, up to 84-88%. This study's findings show a lower percentage of resting time compared to both wild and other captive studies. Notably, excluding the time spent out of sight would raise the resting time to 63.1%. Additionally, if nursing and caregiving (often done while resting) and other resting-like activities were included, the resting time would be 67.06%. These discrepancies can be attributed to variations in ethograms, observation times, the number of observers, and the reproductive cycle phase, highlighting the influence of behavioral bias in animal behavior research. Researchers' expectations and prior assumptions can shape the way behaviors are categorized and interpreted. For instance, the time spent out of sight might be underreported or misclassified based on an observer's bias towards more visible and active behaviors. Behavioral bias can arise from several sources, including the observers' familiarity with the animals, the environmental context, and the specific goals of the study. Such biases can lead to over- or underestimation of certain behaviors, affecting the overall interpretation of the activity budget. To mitigate these biases, employing standardized ethograms, blind observations, and considering a broader range of influencing factors are crucial. Despite the potential biases, this study confirms that the captive spotted hyenas at Zoo Planckendael spend a significant portion of their daylight hours resting, similar to previous studies. Understanding and addressing behavioral biases are essential for improving the accuracy and reliability of animal behavior research.

## **Building an automated system to record and analyse the social behaviour of termites**

Özge Kilic & Dino McMahon

This study seeks to expand upon existing research on the collective behavioural responses of termites (*Reticulitermes flavipes*) to fungal infections (*Metarhizium anisopliae*), by incorporating advanced machine learning analyses through the SLEAP software. Unlike traditional observational studies, our approach allows for a high-throughput, nuanced analysis of termite behaviours, including grooming, cannibalism, and burial, in response to varying stages of fungal infection. Furthermore, this research extends into the exploration of spatial fidelity within semi-natural environments, providing insights into how termites navigate and maintain their social structure under pathogenic stress. By inoculating termite colonies 3D printed habitats with *M. anisopliae* and observing their responses over time, we aim to quantify the behavioural dynamics and spatial organization with unprecedented detail and accuracy. The application of SLEAP for behavioural tracking enables the extraction of complex behavioural patterns and interactions, offering a deeper understanding of social insect behaviour under duress. Our findings will not only shed light on the sophisticated social defences employed by termites but also illustrate the potential of machine learning in ethological research. Unlike manual methods, tracking termites with machine learning software and analysing their behaviour with a combination of clustering algorithms give us more unbiased and real social behaviours. Most importantly, this allows for the comparison of changes in the collective response of the entire colony against pathogens. This study underscores the significance of integrating technological advancements with ecological and biological research to unravel the complexities of animal behaviour in the face of environmental challenges.

## **Feeding faith, fostering AMR (Antimicrobial resistance): The hidden costs of human-rhesus macaque proximity in Delhi**

Nishant Kumar<sup>1,2,3</sup>, Sanath K Muliya<sup>2,4,5</sup>, Lallianpuii Kawlni<sup>2</sup>, Pooja Latwal<sup>2</sup>, Priyanka Justa<sup>2</sup> & Neil Anderson<sup>4</sup>

<sup>1</sup>Dr B R Ambedkar University Delhi

<sup>2</sup>Wildlife Institute of India

<sup>3</sup>University of Oxford

<sup>4</sup>University of Edinburgh

<sup>5</sup>National Zoological Park (Delhi) and the National Tiger Conservation Authority, MoEF&CC (Government of India)

Religious sentiments in South Asia foster unique human-animal relationships, leading to dense populations of commensal species. Such interfaces have several costs, e.g., property loss, injuries and transmission of zoonotic diseases. Urban areas characterised by the indiscriminate use of antibiotics exacerbate the spread of antimicrobial resistance (AMR). AMR is touted a “silent tsunami”, particularly for India, which is a major global supplier of pharmaceuticals. We studied the ecological determinants of antibiotic treatment sensitivity on *Escherichia coli* (n =13 antibiotics) screened from Rhesus macaque faeces (n=308 individuals; 25 troops; 12 sites) in Delhi. Ordinal mixed models (clmm) on AMR prevalence revealed a significant positive association with direct human contact through ritual provisioning. Urbanisation mediated religious tolerance for macaques And the overflow of drainwater in the city might serve as an indirect pathway for AMR. Further, we confirmed the circulation of multi-drug resistant (MDR) *E. coli* strains within the troops (46.1%). Consequently, translocation of macaques engaged in urban conflicts with people may transmit AMR to wildlife and human populations.

## **Comparative niche differentiation of frugivorous and insectivorous bat species in foraging habitats**

Vijay Kumar\* & Vadamalai Elangovan

Department of Zoology, School of Life Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow-226025, India

Bats are highly diverse and ecologically significant mammals and feed on a diversity of plants and insects as a food source based on their foraging nature. Understanding animal's ecological mechanisms leads to niche differentiation between two closely related bat species that prefer to feed on two different foraging habitats. Bats play critical roles in ecosystem dynamics by pollination seed dispersal and insect control. This study aims to investigate the niche differentiation of two distinct bat species that show divergent foraging behaviours. The field observations were performed on foraging behaviour with the help of acoustic monitoring, visual observation, and temporal patterns of foraging activity, and resource utilization of the bat's foraging areas. The foraging behaviour of fruit-eating bats starts after sunset, highest foraging bouts were recorded in the evening hours moderate in mid-night hours and low in the early mornings fruit-eating bats actively engage in feeding on ripe fruits overnight. Whereas, the foraging behaviour under street lights and dark areas, the foraging bouts of insectivorous bats in the early hours poor activity was recorded while in mid-night and early morning hours it reached zero. Food resource availability (insects or fruits) and climatic factors drive niche differentiation and provide insight into the ecological consequences of their foraging strategies. The current findings will contribute to a broader ecological understanding.

## **Understanding and addressing barriers to LGBTQIA+ participation in bird ringing in the United Kingdom**

Rowan Kuminski<sup>1</sup>, Claudia A.F. Wascher<sup>2</sup>, Friederike Hillemann<sup>3</sup> & Barbara Klump<sup>4,5</sup>

<sup>1</sup>School of Biological Sciences - University of Aberdeen

<sup>2</sup>School of Life Sciences, Faculty of Science and Engineering - Anglia Ruskin University - Cambridge

<sup>3</sup>Department of Animal Ecology - Netherlands Institute of Ecology (NIOO-KNAW)

<sup>4</sup>Department of Behavioral & Cognitive Biology, Vienna Cognitive Science Hub - University of Vienna;

<sup>5</sup>Max Planck Institute of Animal Behavior

In the UK over 2,600 volunteers participate in bird ringing, which allows nature enthusiasts of various backgrounds to gain field-based skills that can benefit their professional aspirations. Anyone can participate, but trainees are supervised by licensed trainers, and obtaining a permit requires years of working closely with a trainer to learn proper handling and identification techniques; the trainer is also responsible for deeming trainees fit to obtain a permit. This hierarchy requires trainees to work in small groups with their trainers, often in remote locations, and in some areas there is only one trainer available. As a result, trainees who have negative experiences with their trainer or group may not have feasible alternatives to remain involved in ringing, and there is no clear process to report misconduct. We focus on LGBTQIA+ ringers to identify barriers and develop recommendations for a safer and more inclusive ringing environment, by developing and distributing a survey about LGBTQIA+ ringers' experiences. Understanding barriers experienced by LGBTQIA+ ringers is imperative to addressing these issues and improving the accessibility of ringing and similar activities.

## **Historic diversity and representation in publications in Animal Behaviour**

Edward W. Legg & Ljerka Ostojić

University of Rijeka

Despite science being a global activity, it is widely recognised that certain communities of researchers have been or continue to be underrepresented. The scientific communities in Ecology and Animal Behaviour are increasingly aware of the impacts of such biases. In light of this, many organisations have made commitments to improve their diversity and representation including the Association of Animal Behaviour (ASAB). Here we aim to provide insights into the current and historic patterns of representation in one of ASAB's primary activities, namely, the publication of the journal 'Animal Behaviour'. Specifically, we report on historic developments to i) the geographical locations of authors assessed through reported author affiliations, ii) the study species assessed by reference to species in paper titles and abstracts, and iii) the geographic location of authors that have cited articles published in Animal Behaviour.

## **Endless bounty or fading paradise? Examining Ashmole's hypothesis in the zooplanktivorous Little Auk *Alle alle***

Jacob Ligorria<sup>1</sup>, Antoine Grissot<sup>2</sup>, Dariusz Jakubas<sup>1</sup>, Martyna Syposz<sup>1</sup> & Katarzyna Wojczulanis-Jakubas<sup>1</sup>

<sup>1</sup>University of Gdańsk, Poland

<sup>2</sup>La Rochelle University, France

As central-place foragers, chick provisioning seabirds should minimise the time spent travelling to foraging grounds. However, according to Ashmole's hypothesis, many colonially breeding seabirds deplete local food sources over the breeding time, creating a halo of depleted resources, and birds must increase the distance of foraging trips to find food for their chicks. This hypothesis has been tested for some piscivorous species but never in zooplanktivores. The Little Auk or Dovekie *Alle alle* is a small colonially breeding, and the only zooplanktivorous, Alcid in the North Atlantic. We hypothesised that Little Auks experience Ashmole's halo, resulting in the extension of trip duration over the course of chick rearing. Using video data of parental visits to the nest, we compared the duration of foraging trips at early, middle, and late stages of the chick rearing period in two years: 2021 and 2022. For 2021, we found longer trip durations at the middle compared to early stage. Trips durations did not differ during 2022 and were similar to the duration of the 2021 middle stage. We suggest the effects of Ashmole's halo may not be apparent when birds are already operating at their maximum trip range in early chick rearing. While these results partly support our hypothesis, we also explore other explanations for this difference in behaviour. We suggest seabirds can display a limited response to initially low or depleted local resources when they cannot forage beyond the halo.



## **Virtual nemo: A new system to reduce the number of lab animals required for behavioural experiments**

Noah Locke<sup>1</sup>, Sota Hoshi<sup>1,2</sup>, Laurie Mitchell<sup>1</sup>, Vincent Laudet<sup>1,3</sup>, Shunichi Kasahara<sup>1,2</sup>

<sup>1</sup>Okinawa Institute of Science and Technology

<sup>2</sup>Sony Computer Science Laboratories

<sup>3</sup>Academia Sinica, CNRS IRL 2028

Conducting behavioural experiments with lab animals is expensive, resource intensive, and carries the risk of increased stress and health problems in animal subjects. Particularly, investigating the function of specific colour pattern elements in anemonefish requires lengthy behavioural studies which rely on numerous fish to account for non-repeated trials and individual variation e.g., in body size, experience. Moreover, the difficulty of sourcing enough fish is sometimes compounded by the need for rarely traded species and/or costly pedigree strains, such as colour pattern mutants. Therefore, it is paramount to develop an alternative testing methodology that minimizes the need for live fish in behavioural studies. To address this technical gap, in collaboration with Sony Computer Science Laboratories, Inc., we are attempting to validate the use of virtual reality technology in testing the function of anemonefish colour patterns. The test setup under development is designed to enable live camera tracking and analysis of anemonefish behaviour in response to a 3D animated anemonefish. The 3D model is displayed on a computer monitor and can be easily modified in its appearance (colour, pattern, and size) and movement. This project will provide a more cost-effective and ethical testing platform for conducting reproducible behavioural experiments.

## **Moving with purpose: The interplay of active visual sampling and decision-making for pattern recognition excellence**

HaDi MaBouDi<sup>1,2,3</sup>, Mark Roper<sup>3</sup>, Marie G. Guiraud<sup>3,4</sup>, Lars Chittka<sup>3</sup>, James A.R.

Marshall<sup>1,5</sup>, Andrew B. Barron<sup>1,4</sup>

<sup>1</sup>Department of Computer Science, University of Sheffield, Sheffield, UK

<sup>2</sup>School of Biosciences, University of Sheffield, Sheffield, UK

<sup>3</sup>School of Biological and Chemical Sciences, Queen Mary University of London, London, UK

<sup>4</sup>School of Natural Sciences, Macquarie University, North Ryde, NSW, Australia

<sup>5</sup>Opteran Technologies, Sheffield Innovation Centre, Sheffield, UK

Bees display remarkable cognitive abilities in rapidly and accurately assessing floral rewards during flight, revealing insights into their intricate visual pattern recognition and decision-making processes. Active vision, where animals adjust their visual input through movement, is vital for overcoming perceptual and decision-making challenges that rely on sequential processing. This presentation explores the interplay between active vision and decision-making in bees, leveraging their advanced visual systems. Using high-speed videography, we investigated bees' visual discrimination tasks and discovered that they employ active scanning to efficiently sample and encode visual information. While their scanning varied with different visual patterns, their flight patterns remained consistent, underscoring the crucial role of movement in visual processing. We developed a neurobiologically inspired model to simulate how active vision and non-associative learning shape connectivity in the visual lobe, essential for effective visual discrimination. Our model demonstrates that active scanning combined with efficient decision-making enhances visual representation through spatio-temporal coding, accurately discriminating and generalizing patterns. These findings highlight the significance of active scanning in bee cognition and offer valuable insights for designing bio-inspired robotics with improved vision and pattern recognition capabilities.

## **Social learning in dogs under different attentional states of the caregiver**

Louise Mackie, Jeanne Trehorel & Ludwig Huber

Messerli Research Institute, Vienna

Domestic dogs (*Canis familiaris*) have been documented to “overimitate” humans – a form of social learning – by copying their causally-irrelevant actions. It is suggested that this behaviour results from social, affiliative motivations. Dogs have also been known to behave differently when they are being watched (or not) by humans, such as by following commands better (or worse). In this study, we tested whether dogs’ copying behaviour would also be sensitive to their caregiver’s attentional states. The subject’s caregiver demonstrated irrelevant and relevant actions in the dot-touching overimitation task, then during trials the caregiver was either watching their dog or turned away. Our results revealed no difference in dogs’ irrelevant-action copying, however, we found that dogs approached the dots less per trial when their caregiver was watching them. Dogs also copied their caregiver’s leftward sliding of a door (to obtain a food reward) more accurately when they were being watched by their caregiver. Finally, dogs who copied the irrelevant action did so more often after obtaining their food reward, which supports that these dogs may have had two separate goals: a primary instrumental goal and a secondary social goal.

## **How to train your hawkmoth – Comparing differential conditioning paradigms in the hummingbird hawkmoth**

Anupama Nayak Manel, Anna Stöckl & James J. Foster

Department of Biology, Universität Konstanz

Visual learning in insects can be strongly influenced by the training protocol, where perception and behaviour may vary in response to experiential details. Rapid and reliable color learning has been demonstrated using differential conditioning with reward-aversion paradigms in insects like wasps, bumblebees, and honeybees. While the results of learning assays are linked to the conditioning paradigm, few studies examine the role of aversive stimuli in shaping associations.

Our study compares differential conditioning paradigms in the hummingbird hawkmoth, *Macroglossum stellatarum*, a diurnal moth that forages using vision. To study the efficacy of aversive stimuli, we assess their role in modifying a strong color preference. We pair a sugar-rewarded color with quinine, salt, citric acid, water, or no aversive stimulus on a preferred color. Although these aversive conditions are common in insect learning assays, their performance is rarely compared in the same context. Using Bayesian estimation, we fit learning data to a psychometric function to account for species-specific sampling. We discuss differences in learning curves between conditioning paradigms with respect to moth foraging. Additionally, we highlight the intricacies of comparing learning between solitary and eusocial insects.

## **ManyDogs Project: A big team science approach to addressing biases in canine research**

ManyDogs Project, Tiziana Srdoc<sup>1</sup> & Ljerka Ostojić<sup>2,3,4</sup>

<sup>1</sup>Department of Philosophy, University of Vienna, Austria

<sup>2</sup>Department of Psychology, University of Rijeka, Croatia

<sup>3</sup>Division of Cognitive Sciences, University of Rijeka, Croatia

<sup>4</sup>Centre for Mind and Behaviour, University of Rijeka, Croatia

In recent years, big team science approaches have emerged to promote global cooperation and open science practices across various disciplines, including animal behaviour and cognition. Here, we introduce ManyDogs, an international consortium established to both explore new questions and replicate important findings in canine science. In particular, this collaboration allows us to address breed differences, individual variation, and cultural influences on canine behaviour, minimizing the potential biases of single lab studies. Using the example of the first empirical study, ManyDogs1, which investigated dogs' ability to follow human pointing, we will present how ManyDogs is organized and ensures quality control from the early planning stages to data collection. ManyDogs1 involved 20 research sites in nine countries and collected data from 455 dogs. We found that dogs followed contralateral, momentary pointing at lower rates than previously reported, suggesting limits to the robustness of point-following behaviour. Finally, we will showcase measures to ensure accessibility and inclusion, as well as the constraints and challenges involved in multi-lab collaborations.

## **Evolutionary correlates of neophobia across the avian clade**

Rachael Miller<sup>1,2</sup>, Vedrana Šlipogor<sup>3,4</sup>, Kai R. Caspar<sup>5</sup>, Jimena Lois-Milevicich<sup>6</sup>, Stephan Reber<sup>7</sup>, Claudia Mettke-Hofmann<sup>8</sup> & Megan Lambert<sup>9</sup>

<sup>1</sup>University of Cambridge, Department of Psychology, UK

<sup>2</sup>Anglia Ruskin University, School of Life Sciences, UK

<sup>3</sup>University of Lausanne, Department of Ecology and Evolution, Switzerland

<sup>4</sup>Innovation and Research Centre Lausanna & Sion, the Sense, Switzerland

<sup>5</sup>Heinrich-Heine-University Düsseldorf, Department of Cell Biology, Germany

<sup>6</sup>University of Buenos Aires, Faculty of Exact and Natural Sciences, Argentina

<sup>7</sup>Lund University, Department of Cognitive Science, Sweden

<sup>8</sup>Liverpool John Moores University, School of Biological and Environmental Sciences, UK

<sup>9</sup>University of Veterinary Medicine Vienna, Messerli Research Institute, Austria

Neophobia, or aversion to novelty, is important for adaptability and survival as it influences the way in which animals navigate risk and interact with their environments. Across taxa, neophobia is found to vary considerably, but exploring the wider evolutionary correlates of neophobia across species is hampered by a lack of multi-species, comparative standardised testing. Here, we utilised the ManyBirds Project, a Big-Team Open Science large-scale collaborative framework, to pool efforts and resources from over 100 collaborators at 64 institutions from 23 countries worldwide. We tested responses to novel objects near familiar food (compared with familiar food controls) in 1500+ subjects, 141 bird species across 25 orders incorporating laboratory, field and zoo sites. We tested: 1) individual repeatability in neophobia; 2) species differences; and 3) socio-ecological correlates, including diet, sociality, range and habitat use, while accounting for phylogeny. We found that at the order-level, avian neophobia is markedly affected by phylogeny and negatively correlated with dietary breadth and anthropogenic habitat use, whereas year-round territoriality and solitary habits are associated with stronger neophobic responses. There was individual repeatability across time (across test rounds) and condition (between control & test). Our approach and results grant novel insight into the socio-ecological correlates of variability in neophobia across the avian clade.

## **Forest elephants in a human-dominated landscape: are they risk-takers?**

Lea Mimeault & Robert B. Weladji

Concordia University, Montreal, Canada

Habitat loss from forest conversion to agriculture threatens tropical biodiversity. Despite documented human-mediated predation risk avoidance, some species may adopt riskier strategies to gain access to food. Recent conversion of a logging area in southern Cameroon to an agro-industrial plantation coincides with increased sightings of forest elephants near human settlements, which is unusual and suggests a drastic change in their habitat use. To examine the influence of human activity on forest elephant habitat use, twenty-one camera traps were deployed along the border between the agro-industry unit and the community land, with reconnaissance walks conducted between stations. Indirect observations indicate that elephant relative abundance was negatively influenced by human activity, suggesting a risk-avoidant behaviour. This however contrasts with the increasing reports of elephants visiting villages, pointing to a complex trade-off between risk and reward. Moreover, reconnaissance walks proved more effective than camera traps in providing a greater amount of data, highlighting the importance of selecting the appropriate method based on research objectives. Our study enhances our understanding of elephant behavioural responses amidst rapid habitat loss, which is crucial for developing effective management and conservation strategies.

## **Virtually anything can happen: investigating short-term memory in capuchin monkeys using virtual environments**

Andreea Miscov, Emma S. McEwen, Justin Ales & Amanda Seed

University of St Andrews, School of Psychology and Neuroscience

Computerised technology is an increasingly popular tool for cognitive testing with non-human animals and has numerous benefits, such as tighter control over stimuli presentation and recording responses. Recently, virtual environment (VE) software has been successfully implemented in cognitive research with non-human primates. In VEs, novel stimuli can be presented in innovative ways allowing us to study phenomena in novel ways unrestricted by real-world space. We present evidence from capuchin monkeys (*Sapajus apella*) in a delayed-response task within a VE presented on a touchscreen. We compared capuchins' short-term memory performance between a VE task and an equivalent physical task. Preliminary data shows an effect of delay on accuracy in the VE, as in the physical task. We show that VE are a feasible method for studying cognition with capuchin monkeys, offering an engaging way to study primate cognition in without the physical constraints that are often present when designing apparatuses.



## **Are scientific communications on wild animal psychology biasing our perceptions of species? A nationwide test with wild red foxes**

F. Blake Morton<sup>1</sup>, Dom Henri, Kristy A. Adaway, Carl D Soulsbury<sup>2</sup> & Charlotte R. Hopkins<sup>1</sup>

<sup>1</sup>University of Hull

<sup>2</sup>Uni of Lincoln

Publications on wild animal psychology are growing in popularity, but can quickly escalate and become highly sensationalised within popular culture. There is very little research to understand whether or how this leads to biases among scientists and the general public (e.g., “only intelligent wildlife are interesting to study”...“bolder predators are pests to society”). Through a national-level survey (n = 1,364 participants), we tested whether communicating psychological information about a wild urban predator, the red fox, biases people's tolerance of them. Half of participants were given videos or press releases on fox boldness and problem-solving, the other half were given videos or press releases on fox habitat use. After, all participants completed the same 24-item questionnaire evaluating their tolerance of foxes. We found no significant effect of psychological content on people's tolerance of foxes compared to people that were given ecological information. We discuss an urgent need, beyond this one study, for further rigorous science to take seriously the possible impacts (both positive and negative bias) that scientific communications about wild animals may have on people.

## Escaping bias in social network analysis: How to avoid overestimating the strength of social bonds

Helen K Mylne<sup>1</sup>, Dan W Franks<sup>1</sup>, Jackie Abell<sup>2</sup>, Colin M Beale<sup>1,3</sup>, Lauren JN Brent<sup>4</sup>, Jakob Bro-Jørgensen<sup>5</sup>, Kate E Evans<sup>6</sup>, Jordan DA Hart<sup>4</sup>, Dabwiso Sakala<sup>7,8</sup> & David Youlton<sup>8</sup>

<sup>1</sup>Leverhulme Centre for Anthropocene Biodiversity, University of York, UK

<sup>2</sup>Centre for Agroecology, Water and Resilience, Coventry University, UK

<sup>3</sup>York Environmental Sustainability Institute, University of York, UK

<sup>4</sup>Centre for Research in Animal Behaviour, University of Exeter, UK

<sup>5</sup>Mammalian Behaviour and Evolution Group, Department of Evolution, Ecology and Behaviour, University of Liverpool, UK

<sup>6</sup>Elephants for Africa, London, UK; Gothenburg Global Biodiversity Centre, Gothenburg, Sweden

<sup>7</sup>Department of Geography, University of Zürich, Switzerland

<sup>8</sup>African Lion and Environmental Research Trust, Livingstone, Zambia

Social network analysis is commonly used to analyse animal social structure, but edge weight (social bond strength) estimation methods can be biased. Frequentist methods (e.g., Simple Ratio Index, SRI), suffer with low data availability and require data deletion, because their inherent flat prior will accept any edge weight value and the outputs contain no uncertainty. Bayesian methods can reduce bias with sensible alternative priors, but when networks are sparse, a single prior cannot be sensible for all associations. How can we adapt current methods to estimate edge weights in a less biased way? Neither the SRI or Bayesian methods account for zero-inflation, so they produce weights biased towards stronger edges than the true network. Using group-based data on male African savannah elephants, we show that adding zero-inflation to the Bayesian approach by using a conditional prior produces a model that performs better than current methods, especially for low-density networks. This reflects that the process deriving the true edge weight contains two-steps: 1) probability of ever interacting, followed by 2) frequency of interaction. This will reduce bias in future network studies.

**Research at the wolf science center**

Lina Oberließen & Marianne Heberlein

CF-WSC, University of Veterinary Medicine, Vienna, Austria

The Core Facility Wolf Science Center is part of the University of Veterinary Medicine in Vienna, Austria, and offers the unique opportunity to do research on wolves and dogs that were (hand-) raised under similar conditions. We run own studies, e.g., on self-recognition, gait development, and socialisation but also work together with research partners from different fields of interest (behavioural biology, physiology, veterinary medicine, archeology).

We will present our philosophy, our way of working, how we raise, keep, and train our animals at eye-level, and how we prepare them for their scientific career. We will also present concrete research projects and discuss how we try to address biases in our everyday work. This is of course extra challenging in a research environment in which the trusting relationship and mutual understanding between animals and humans is the basis for all research.

## **Play ontogeny in young chickens is affected by domestication, tameness and sex**

Rebecca Oscarsson & Per Jensen

IFM Biology, AVIAN Behaviour Physiology and Genomics Group, Linköping University, Linköping, Sweden

It is known that young chickens display different play behaviour. Moreover, domestication is believed to have increased playfulness, and tameness is hypothesized to be the main trait driving the domesticated phenotype. Furthermore, potential sex differences in play had not been investigated in chickens. Therefore, in three separate studies, we aimed to describe potential effects of (1) domestication, (2) tameness, and (3) sex, on chicken play ontogeny. First, we compared the ancestral Red Junglefowl (RJF) and the layer hybrid of White Leghorn (WL). Secondly, we compared Red Junglefowls selected for high (RJF HF) and low (RJF LF) fear of humans. Lastly, male, and female WL were compared. The frequency of 14 behaviours, categorized as locomotor, social and object play were recorded. In study (1), total and object play were more common in WL, whilst locomotor and social play were more frequent in RJF. In study (2), total, object, and locomotor play were more common in RJF LF, and social play more common in RJF HF. In study (3), total, social and object play were more common in males, whereas no difference was found for locomotor play. Hence, domestication has led to a higher occurrence of play, and the finding that tame chicks play more indicate an important role of tameness for domesticated behaviour. Lastly, that males play more than females may be related to the large sexual dimorphism in the species.

### **Cape buffalo movement and behaviour in thicket landscapes in South Africa**

Rebecca O'Sullivan, Nikki Marks, Catherine Hambly, Craig Tambling & Michael Scantlebury

Cape buffalo (*Syncerus caffer caffer*) are large herbivores found across Eastern and Southern Africa. They are primarily confined to a fragmented network of protected areas which has raised conservation concerns surrounding climate change, habitat loss and disease. Although they inhabit diverse habitats, most research has focused on buffalo in savanna grasslands. Understanding their movement and behaviour in varied habitats may improve their welfare and conservation in protected areas. This study examines Cape buffalo ecology in the Eastern Cape of South Africa within the Albany Thicket biome, which is characterised by dense, succulent vegetation known as thicket. Direct observation of buffalo in these environments is logistically challenging, creating an opportunity to use remote sensing technology to study this population. Biologging collars have tracked buffalo movements in the reserve since 2021 and this ongoing study aims to assess seasonality in home range and travel distances of female buffalo. This research enhances understanding of buffalo space use in thicket landscapes and how this may be affected by a changing climate.

## **Thermoregulatory response of West African dwarf does of varying coat colouration to diurnal changes in temperature**

F. G. Oyeniyi<sup>1</sup> & E. O. Ewuola

<sup>1</sup>Ekiti State Polytechnic and University of Ibadan

<sup>2</sup>University of Ibadan

Due to its high temperatures and little precipitation already, Sub-Saharan Africa is especially badly struck by climate change. The use of modern technologies on farms is still minimal, and these region's economies are heavily reliant on agriculture. This has serious implications and necessitated the conduct of an experiment that sought to better understand how a certain goat breed (West African Dwarf) noted for its dynamic coat colour pattern and found in 15 West African countries responds to varying temperature as influenced by solar radiation. The goat Unit of the Teaching and Research Farm, University of Ibadan was the experimental location. Thirty (30) West African Dwarf does were grouped into six treatments on the basis of their coat colours viz: Black, Brown, White, White/Black, White/Brown, and Brown/Black. The study was carried out during the low temperature humidity index (THI) of the year – June, July, August. Parameters determined include: Pulse Rate (PR, Beats/minute), Respiratory Rate (RR, Beats/minute), Rectal Temperature (RT, °C). Ambient Temperature (°C) and Relative Humidity were measured twice daily to estimate THI. Data obtained from the study were analysed using ANOVA at  $\alpha 0.05$ . It was observed that the average daily PR was significantly lower in White does ( $53.65 \pm 2.28$ ) than those of other coat colours with the exception of White/Brown does ( $54.65 \pm 2.47$ ). Rectal temperature was significantly lower in White does ( $38.65 \pm 1.04$ ) than those of other coat colours. Respiratory rate was significantly lower in Brown/Black does ( $52.10 \pm 2.60$ ) than White/Black ( $54.96 \pm 2.73$ ) and Black does ( $54.70 \pm 5.04$ ). A full comprehension on the role of coat colouration in helping goats to adapt to changing environmental conditions is still evolving. Morphologic traits linked to adaption, like coat colour, could guarantee the animals' survival. This study demonstrated that WAD does with lighter coat colours were better adapted to a humid tropical environment as evinced by their physiological responses.

## **Using an automated detection algorithm to understand the singing phenology of a Western Ghats endemic species**

Aditya Panigrahy, Chiti Arvind & V.V. Robin

Indian Institute of Science Education and Research (IISER), Tirupati, India

Passive acoustic surveys have proven efficient for monitoring vocal activities. BirdNET, a deep-learning algorithm, uses neural networks to train classifiers to identify species from vast audio datasets. However, the performance of BirdNET in detecting species with highly variable repertoires remains underexplored. Our study, assisted with passive acoustic monitoring, uses custom classifiers to investigate the seasonal variations in acoustic activity patterns of the White-Bellied Sholakili (*Sholicola albiventris*). By developing and testing a custom classifier within BirdNET, we aim to uncover any observational and statistical biases that may influence the detection and analysis of this species' vocal behaviour. Our results show that multispecies classifiers outperform binary classifiers. Peak vocal intensity was noted from April to July, primarily between 5-6 am, with additional activity noted from 6-8 am during February and March. April to June (breeding period) showed higher false positive rates and lower recall (0.3218), while the non-breeding season had higher recall (0.662) but more false negatives. Such variable performance over different months questions the presence of potential biases like feature learning and other vocalisations. Addressing these biases and scaling the algorithm across landscapes can offer novel insights into species phenology and behaviour.

## **Impact of low and high temperatures in bumblebees' (*Bombus terrestris*) cognition**

Peyre, Y. & Martin-Ordas, G.

University of Stirling

Despite being responsible for 75% of crop pollination and essential for ecosystem maintenance, pollinators, are declining worldwide. Among other threats, climate change has been shown to have direct (e.g., physiology, fitness, survival) and indirect (e.g., plant/pollinator relationship) effects on this decline. However, how climate change potentially impacts pollinators' cognition remains sparsely studied.

Learning associations between a flower and a reward, remembering resources' location are complex cognitive abilities that pollinators require to forage efficiently and secure the colony's fitness. This study aims to assess how these abilities might be impacted by abnormal temperatures associated with climate change.

We examined whether exposure to different temperatures (14°C, 25°C or 32°C) impacted bumblebees' (*Bombus terrestris*) learning (colour learning, reversal learning) and memory abilities (spatial memory, long-term memory). Preliminary results show that when exposed to 14°C or 25°C bees performed better in learning and spatial memory tasks than when exposed to 32°C. However, bees' long-term memory did not differ across conditions. These results suggest that acute exposures to abnormally high temperatures can lead to a cognitive impairment that could potentially impact bumblebee's individual survival, colony's fitness and entire ecosystems.

### **New indicators of emotion in horses**

Romane Phelipon<sup>1</sup>, Anaïs Ascione<sup>1</sup>, Alice Ruet<sup>1</sup>, Aline Bertin<sup>1</sup>, Sophie Biau<sup>2</sup>, Cécile Arnould<sup>1</sup>, Laetitia Boichot<sup>2</sup> & Léa Lansade<sup>1</sup>

<sup>1</sup>NRAe, UMR 85 PRC, CNRS, UMR 7247, IFCE, University of Tours, Nouzilly 37380, France

<sup>2</sup>French Horse and Riding Institute, Avenue de l'École Nationale d'Équitation, Saumur 49411, France

The emotional states of anticipation and frustration may be experienced by animals throughout their lives. The term positive anticipation is defined by the animal's expectation of a positive, familiar event, such as the anticipation of a reward. In contrast, the emotion of frustration is expressed by the animal's inability to obtain the expected reward. The distinction between these two states is subtle, and it is crucial to be able to differentiate between them.

The objective of this study was to characterise the behaviours, facial expressions and locomotor parameters exhibited by twenty-one horses in two conditions of opposite valence, which were designed to induce positive anticipation and frustration. The results demonstrated that in a context of positive anticipation, the horses exhibited a lowered neck, ears oriented forward, and an advanced upper lip, accompanied by an increased stride frequency and overall locomotor activity. In situations of frustration, the horses exhibited a higher neck with ears back or to the side, accompanied by ear movements and eye blinks, and interacted more with nearby humans. This study describes new possible indicators of positive anticipation and frustration in horses, and the identification of these indicators offers new perspectives for accessing the horse's emotional states.





## **Experimenters' assumptions and pigeons' perceptions: are we speaking the same language?**

Carlos Pinto

University of Minho

In laboratory studies of animal behavior, interpretations of how a task is learned, or of which stimulus characteristics are attended to are, ultimately, inferences. So, despite care to minimize the sources of stimulus control, there is always potential for experimenter assumptions being at odds with what an animal learns from a task.

Examples from our work in learning flexibility and coding in pigeons shed light on this disconnect between experimenter and animal subject. In a series of studies, pigeons learned a matching-to-sample task where, following the presentation of a stimulus, a choice had to be made between two options – the option to be chosen depended on the duration of the initial stimuli. An inter-trial interval traditionally separates trials, and in a variation of the task a delay is introduced before choice. We found that animals may learn a task by using task components (such as the inter-trial interval) deemed – by the experimenter – irrelevant to learning the task. Not only that, but individual animals may also differ in how they use different task components. Also, delays may be interpreted differently across tasks. We describe our attempts to clarify some of these issues, by controlling for confounds. Task limitations underscore the importance of employing a variety of procedures to study a phenomenon of interest.

## **Receiving mixed signals? Masked audiovisual courtship affects female ring dove responses in between- & within-bird tests**

Denise Piringer<sup>1</sup>, Dani Biegler<sup>1,2</sup>, Conny Bourgmeyer<sup>1</sup>, Leonida Fusani<sup>1,2,3</sup> & Cliodhna Quigley<sup>1,2</sup>

<sup>1</sup>Department of Behavioral & Cognitive Biology, University of Vienna.

<sup>2</sup>Vienna Cognitive Science Hub, University of Vienna

<sup>3</sup>Konrad Lorenz Institute of Ethology, University of Veterinary Medicine, Vienna

Multimodal signals, including multiple components in different sensory modalities, are widespread in animal communication. Investigating the information conveyed by single components and their interaction can reveal the potential purposes of multimodality. Here, female ring doves (*Streptopelia risoria*) were exposed to playback of full audiovisual (AV), or unimodal male courtship (audio or visual: A, V) by occluding one modality. Female behaviour was scored and compared across conditions. In a between-bird design, 21 females were exposed to AV, A or V (N=7 per group). Sexual responses occurred in all conditions, but mostly in AV and V, whereas A elicited most contact calls. Overall, we found large inter-individual differences. This motivated a second, within-bird experiment in 12 females with all 3 conditions (AV, A, and V). Results confirmed previously indicated patterns, suggesting courtship components are redundant. However, strong contact calling in A may indicate non-redundancy. Future work will test if the auditory component suffices to provide sexual context. Taken together, complementary experimental designs (between- or within-individual) can provide more complete insights.

## **Challenges in lab settings for evolutionary research on *Nephilingis cruentata*: A study of sexually dimorphic growth**

Tim Prezelj

Research Centre of the Slovenian Academy of Sciences and Arts, University of Ljubljana Faculty of Education

Science, particularly descriptive ethology, is influenced by societal norms despite claims of objectivity. While sociology increasingly recognizes the complexity of gender differences, biology often adheres to a binary framework. This is evident in the highly dimorphic spider *Nephilingis cruentata*, where adult females are 75 times heavier than males. Our study explores the origins of these differences through individual growth trajectories.

Results suggest that sex differences in body size become apparent only approximately after one-half of the developmental period for males and one-fourth for females, meaning the developmental time for males is much shorter than females. However, there is importance of focusing on individual differences rather than solely grouping by sex. Even in species with marked sexual dimorphism, sexes may temporarily be more similar than expected, with important individual variability. Our research aims to understand how individual growth patterns relate to the sexual size differences observed at maturity.

Studying developmental histories is crucial to move beyond a normative view of sex differences and achieve a more nuanced, individual-level understanding. Additionally, scientific methodology presents challenges. Laboratory results might not accurately reflect natural dynamics due to specimen selection, artificial reproduction programs, and controlled growth conditions. These factors, along with researchers' biases, can shape interpretations and overlook alternative explanations. Our study highlights the need for a nuanced understanding of sex differences in both natural and laboratory settings.

## **Leveraging experience across contexts: Falconry and raptors**

Charlie Russell

University of East Anglia & British Trust for Ornithology

Birds of prey are charismatic species that have captured the imagination of people for centuries through their dramatic appearance, epic migrations and unique hunting relationship with falconers. Falconry as a sport has been influential on our understanding of raptor behaviour and conservation of wild species. Despite this, research often overlooks the years of experience falconers have working with these birds, and the potential benefits of working with captive bred birds in a controlled environment to understand wild populations. As part of a project to understand how biologgers affect bird behaviour we have started to engage with this community utilising their captive birds that are free-flown and given the opportunity to exhibit natural behaviours. With this has come a host of benefits for understanding animal behaviour, including collaborations for our research, training for working with wild birds, funding in-situ research and contributions from unique perspectives and experiences. We will present preliminary results from our work, and advocate for further engagement with similar groups in other contexts.

## **The interlink between socio-ecological factors and cognitive development on foraging competence in wild meerkats**

Tommaso Sacca<sup>1,2</sup>, Zoe Turner<sup>1,2</sup>, Elisa Protopapa<sup>1,2</sup> & Sofia Forss<sup>1,2</sup>

<sup>1</sup>Department of Evolutionary Biology and Environmental Studies, University of Zurich

<sup>2</sup>Kalahari Research Center, Kuruman River Reserve, South Africa

The ability to acquire food (i.e., foraging competence) is fundamental for survival and it is presumably influenced by cognitive abilities (Ecological Intelligence Hypothesis). Studies investigating this hypothesis have mainly focused on adult individuals. Yet, these skills are acquired during the developmental period and ontogenetic foraging competence is critical for survival. In meerkats (*Suricata suricatta*), adults sustain pups by food provisioning, and pups associate closely with adults, favouring most helpful ones. However, pups that invest more time foraging independently reach better foraging competence later in life and experimental provisioning increased pup's foraging time (Thornton 2008). Thus, the pup's ability to identify and follow most helpful adults may allow them to invest more in independent foraging, influencing future competence. To disentangle the pups' learning strategies, we followed 19 pups from 8 litters and combined natural observations with cognitive experiments at five time points from nutritional reliance on adults into early adulthood. We then investigated the effect of socio-ecology (e.g., group composition) and individual characteristics (cognitive skills), in the development of foraging competence in meerkats.

## **How subtle protocol choices can affect biological conclusions: Great tits' response to allopatric mobbing calls**

Ambre Salis<sup>1</sup>, Jean-Paul Lena<sup>2</sup>, & Thierry Lengagne<sup>2</sup>

<sup>1</sup>Department of Life Sciences, Imperial College London, Ascot, UK

<sup>2</sup>Univ Lyon, Université Claude Bernard Lyon 1, CNRS, ENTPE, UMR 5023 LEHNA, F-69622, Villeurbanne, France

In the last ten years, numerous replicated studies showed divergent results from the original papers, leading to the recognition that science may be facing a replication crisis. Apart from fraud or natural population variability, different results may emerge from flexibility in the protocol and/or restricted sample sizes. Replication studies are therefore fundamental to assess how robust a finding can be. However, while the original authors may be prone to p-hacking (to collect data, select data or use statistical analyses until nonsignificant results become significant), the replication-authors are, on the contrary, probably unwittingly prone to show opposite results (i.e., null-hacking). In this study, we face the unique opportunity to compare replicated studies with no null-hacking bias. Two teams independently investigated the response of great tits (*Parus major*) to mobbing calls of an allopatric species, in their natural and reversed order, on the same population. We first discuss how subtle protocol choices, especially regarding the soundtrack preparation and playback methodology, can explain variation in the results. In addition, we show that, although the effect sizes of the differences of interest are similar, biological conclusions solely based on the p-value would be different. Thus, we note the pitfall of reliance on p values, especially with small samples.

### **Barriers to Open Data re-use: a mapping review**

Petra Šarić<sup>1,3</sup>, Antica Čulina<sup>2</sup>, Petra Anić<sup>1,3,4</sup> & Ljerka Ostojić<sup>1,3,4</sup>

<sup>1</sup>Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, Croatia

<sup>2</sup>Ruđer Bošković Institute, Zagreb, Croatia

<sup>3</sup>Division of Cognitive Sciences, Faculty of Humanities and Social Sciences, University of Rijeka, Rijeka, Croatia

<sup>4</sup>Centre for Mind and Behaviour, University of Rijeka, Rijeka, Croatia

Open Data is increasingly being mandated by both publishers and funders. One of the main benefits for scientific communities is that existing data can be used to investigate new research questions through secondary analyses. In ecology, data sharing is seen as critical in achieving one of the main research questions, i.e. identifying unifying mechanisms across species, space, and time. While previous research found that ecology researchers commonly provide Open Data, re-use by other researchers is not yet as well established. We will present a mapping review of empirical reports surveying researchers' experience with data re-use and theoretical papers discussing barriers to data re-use more generally. We will highlight, categorise, and discuss the barriers to data re-use in all scientific fields in general. The results of this mapping review will – in a second step - serve as the basis of a survey assessing ecology researchers' attitudes, behaviours, and experiences with using Open Data in their research fields.



## **Biases in animal metacognition**

Calum Sims

University of Bristol

There has been a long-standing debate concerning the interpretation of apparently metacognitive behaviours in animals, hampered by the use of 'STRANGE' subjects (Webster and Rutz 2020) and the prevalence of biases in the theoretical discussions surrounding them. I argue that an anthropomorphic bias leads some researchers to treat animal metacognition as 'trivial' (Dorsch 2022), disconnected from 'genuine' forms of self-knowledge. I review the history of the animal metacognition debate (Smith, Couchman and Beran 2012; Beran 2019) and argue that the biases therein have been maintained in part by unwarranted generalisations which interact with our anthropomorphic biases in interesting ways. I then present educational interventions aimed at resolving this issue by improving 'metacognitive sensitivity' (Fleming 2023), drawing on studies of animal behaviour to argue that our disposition-to-generalise (Rouault 2018) can be improved by developing diverse perspective-taking practices across interdisciplinary and other boundaries. I conclude by exploring the philosophical implications of animal metacognition for human self-awareness.

### **Olfactory conditioning to modulate affective state of horses?**

Johanna Stenfelt<sup>1</sup>, Vincent Bombail<sup>2</sup>, Hanna Sassner<sup>1</sup>, Björn Forkman<sup>3</sup> & Maria Vilain Rørvang<sup>1</sup>

<sup>1</sup>Department of Biosystems and Technology, Swedish University of Agricultural Sciences, Alnarp, Sweden.

<sup>2</sup>Animal and Veterinary Sciences, Scotland's Rural College, Edinburgh, UK.

<sup>3</sup>Department of Veterinary and Animal Sciences, University of Copenhagen, Copenhagen, Denmark.

This study explores the potential of appetitive olfactory conditioning to modulate affective states in horses through exposure to positively associated odours. Tactile stimulation is proposed as a positive, low-arousal unconditioned stimulus. As part of a larger project, we evaluated the effects of odourised livestock brushes on odour association and affective states in horses. Forty-two Icelandic horses were divided into two treatment groups with access to either odourised or non-odourised livestock brushes in their home pastures. We investigated individual preferences for the experimental odour (lavender essential oil) compared to another novel odour (orange essential oil) before and after a 4-week conditioning period to assess the impact of conditioning. Additionally, we exposed the horses to both odours during short-term sessions, using qualitative behavioural assessment and heart rate recordings to evaluate the effects on their affective states. To minimize observational biases, the experimental design incorporated measures such as blinding observers to treatment groups and odours, along with validating results through inter- and intra-observer reliability.

## **Unsupervised computational analysis of chicks' vocal repertoire**

Antonella M.C. Torrisi, Ines Nolasco, Elisabetta Versace & Emmanouil Benetos  
Queen Mary University of London

Animal vocalisations are essential for communication and key welfare indicators. In chicks (*Gallus gallus*), calls are crucial for their development through interactions with hens and siblings. Previous research categorised chick calls into four types linked to affective states and social contexts, but this classification relies on subjective human annotation, leading to an incomplete framework with undefined calls.

Current methods lack systematic validation and are difficult to replicate. To address these gaps and improve the current classification, we introduce an automated framework for the detection and extraction of features from chicks' calls. We analysed over 5,600 calls from 12 one-day-old chicks, extracting time and frequency domain features. Clustering techniques revealed that chick calls optimally divide into three distinct categories under our experimental condition.

This approach is more robust and replicable than traditional methods, efficiently handling large datasets and reducing reliance on individual judgements. Our study provides a systematic classification of chick vocal repertoire and lays the groundwork for developing algorithms for automatic feature extraction and unsupervised analysis of animal calls, with implications for broader behavioural studies and welfare assessment across species.

## **Beyond gender – asking questions at animal behaviour conferences**

Camille A. Troisi<sup>1</sup> & Barbara C. Klump<sup>2,3</sup>

Ghent University, Belgium

University of Vienna, Austria

Max Planck Institute of Animal Behavior, Germany

The field of animal behaviour is increasingly acknowledging biases in its study animals. Frameworks like STRANGE address these biases, making them more visible and transparent. Biases on the level of the scientists conducting this research are however generally not addressed. The reduced visibility of minorities (e.g. women, LGBTQ+, non-white) in the scientific community is thought to be a cause of underrepresentation among scientists, particularly in senior positions. Asking questions at conferences can increase this visibility. However, several studies have reported biases in question-asking behaviour (QAB). Specifically, women ask fewer questions than men. Here, we aim to understand the causal relationship between external and internal factors influencing this bias by combining observations with a survey. We furthermore aim to understand the intersectionality of this bias by examining other factors including ethnicity, sexual orientation and seniority across multiple conferences. As such we are recruiting people who are interested in collecting data. Such a complementary approach will enable us to better understand and ultimately decrease biases in QAB at future conferences.

## **Uncovering pen dependant behavioural patterns and decrease potential stress in farmed American mink (*Neogale vison*)**

van Schaik, R.M.C.<sup>1</sup>, Meagher, R.K.<sup>1</sup> & Díez-León, M.<sup>2</sup>

<sup>1</sup>Dalhousie University, Nova Scotia, Canada

<sup>2</sup>The Royal Veterinary College, London, UK

The welfare of the American mink (*Neogale vison*) within the agricultural sector has increasingly become a topic of discussion. Alterations to the existing penning system are hypothesised to improve mink welfare, but are difficult to implement within existing farm management strategies. This study has set the goal to investigate how aspects of pen size, nest-box and overall housing design affect the behaviour and welfare of farmed mink, within existing farm management strategies. Studying an animal's behaviour, specifically in domesticated animals, can help grow our understanding of when behaviour indicates stress. Including if the stress has a natural or artificial origin and how these type of behaviours affects mink welfare. Within this study, three experiments will be conducted in order to determine key differences in behaviour within existing penning systems, and developing changes to the penning system accordingly. For the first experiment a behavioural study will be conducted, wherein adult female mink behaviour will be compared post-weaning between three penning systems commonly used on mink farms, that differ in design and size: the whelping pen, the drop box and the European penthouse. This study will take measure of various factors regarding the individual mink and environmental traits. With the second experiment, we conduct a behavioural study focusing on juveniles, determining whether changes in nest-box design will alter their nest-box usage and preference. Two mink (male/female) from the same litter, will be housed in a two-combined drop box pen and provided the option of two nest-boxes with a one-variable change. This experiment will study whether the variable will affect potential nest-box soiling and farm-management strategies. The third study utilizes the data gained from the previous experiments to determine which pen design and nest-box combination will most enhance mink welfare, while limiting problems for the existing farm management strategies. With this research, we aim to find an effect of different penning systems on mink behaviour. This study will be used as a starting point for subsequent studies considering other aspects of the pen and farm design.

## **Early biases: The adaptive role of transient predispositions in young animals**

Elisabetta Versace

Queen Mary University of London

The more we observe newborn animals, the more we discover they have biases and expectations about the world. For instance, soon after hatching, inexperienced poultry chicks are attracted to upward movement, biological motion, changes in speed, specific colours (like blue vs. green, and red vs. yellow), particular sounds, face-like configurations, and even hollow objects. Similarly, other precocial hatchlings, such as tortoises, show an attraction to faces despite being solitary. Altricial social animals, like human babies, display comparable preferences for faces and various types of motion. These biased preferences or expectations are called predispositions. Predispositions are widespread and help animals identify stimuli with high adaptive relevance. However, predispositions differ from ethological fixed action patterns by being more flexible and transient. The reason underlying the differences between fixed action patterns and predispositions are not yet clear. In this talk, I will explore the role of predispositions at the beginning of life, considering them as priors with varying strengths. I will analyse the trade-offs imposed by false positives and false negatives at different ages, presenting a new model on the adaptive role of multiple predispositions in early life. This model is based on empirical evidence from multiple species, highlighting how these early expectations shape an animal's interaction with its environment in the short and long term.

### **Population interconnectivity shapes the distribution and complexity of chimpanzee cumulative culture**

Andrew Whiten, Cassandra Gunasekaram, Federico Battiston, Onkar Sadakar, Cecilia Padilla-Iglesias, Maria A. van Noordwijk, Reinhard Furrer, Andrea Manica, Jaume Betranpetit, Carel P. van Schaik, Lucio Vinicius & Andrea Bamberg Migliano

While cumulative culture is a hallmark of hominin evolution, we provide evidence suggesting its origins can be traced to our shared ancestry with chimpanzees. To trace cultural transmission among chimpanzees, we used genetic markers to identify long-distance pathways that provided past opportunities for cultural transmission, as adult females transferred between communities. Such linkage significantly raised the odds of communities sharing complexes of multiple tools (tool-sets), more than simpler technologies. We applied a new 'reinforcement analysis' to disambiguate causality here, finding that networks of shared complex toolsets predict migratory pathways indexed by genetic markers, but not the reverse as expected if genetics were the principal influences on behavioural correlates. Further, where we find some communities employing complex tool sets and others using only simpler versions from which the complex versions may have developed, in all cases the genetic markers reveal pathways of past migration connecting them. As in humans, cultural complexification likely happened in steps, with transmission between populations, incremental changes and repurposing of technologies.

## **Topological alignment interaction moderates informed individual transmission in animal group-like self-propelled particles**

Yufei Xiao<sup>1</sup> & Yinong Zhao<sup>2</sup>

<sup>1</sup>UNC Chapel Hill

<sup>2</sup>Shanghai Jiaotong University

Recent studies in polar alignment models have predominantly focused on metric distance interactions, overlooking the significance of topological interactions. However, empirical evidence [Ballerini et.al. (2014) PNAS] suggests that topological interactions exhibit distinct behaviors under similar noise and density conditions. For instance, near the polar transition with low alignment strength, metric flocks tend to form bands, while topological flocks do not [Zhao et.al. (2022) Arxiv].

Our research aims to expand on this understanding by introducing a novel element: informed individuals. These are agents that not only align with their neighbors but also respond to an environmental gradient, simulating phenomena like cellular chemotaxis, animal migration cues, or pheromone trails. We seek to investigate how this environmental information concentration interacts with existing alignment dynamics in topological flocking systems. Our approach employs a modified Vicsek model with KNN-based topological interaction, implemented numerically using the Euler method in Python. The model incorporates a weighted force for informed individuals, aligning them with an environmental gradient direction. Our empirical analysis explores the phase space defined by the Peclet number and alignment strength, focusing on two extreme cases: disordered clusters and disordered swarms. By varying the ratio of informed individuals, we observe the global polarization of the flock, expecting to see convergence with high fluctuations that suggest bistable states. We anticipate a continuous phase transition in the swarm case and a discontinuous, faster-saturating transition in the cluster case. Additional analyses will examine cluster size, factors influencing polarization, and differences between informed and uninformed individuals. The theoretical component of our study will employ Mean Field Approximation (MFA) to formulate predictions for both swarm and cluster scenarios. We use the swarm case as a benchmark, developing analytical results for polar order as a function of the informed individual ratio and relaxation time.

By varying these parameters, we aim to test the accuracy of our predictions and identify deviations that may indicate cluster effects. This approach allows us to distinguish between predictable (trivial) and unpredictable aspects of the model, providing insights into the complex dynamics of topological flocking systems with informed individuals. Through this comprehensive analysis, we hope to contribute to a deeper understanding of collective behavior in biological and artificial systems influenced by environmental cues.