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**Wednesday November 28**

<b>Time</b>	<b>Activity</b>	<b>Location</b>
9:50-17:00	PhD workshop Open Science	Zaal 525
17:00-18:00	Registration	Tweede lounge
18:00-20:00	Dinner	Restaurant
	<b>BRILL Baerends lecture</b> – sponsored by BRILL Publishers	Abdijzaal
20:00-21:00	Chair: Mariska Kret Sarah Brosnan - Georgia State University - Comparative Economics: Using economic paradigms to better understand the evolution of primate cooperative decision-making	
21:00-23:30	Drinks	Pub

**Thursday November 29**

	<b>Open sessions</b>	Abdijzaal
	Chair: Piet van den Berg	
9.00-9.15	Hanja Brandl - University of Hamburg - Social information use in an unpredictable habitat; a case study on wild zebra finches	
9.15-9.25	Callum McDiarmid – Macquarie University - Calling in the heat: the zebra finch incubation call depends on heat but not reproductive stage	

9.25-9.35	Evvy van Berlo - Leiden University - Attention to emotions in bonobo's	
9.35-9.50	Astrid Rox – BPRC, Utrecht University - Infanticide risk may determine species-specific stress responses to male introductions in macaques	
9.50-10.00	Judith Varkevisser – Leiden University - Seeing voices: is vocal learning enhanced by multimodal exposure to a tutor?	
10.00-10.20	Tonko Zijlstra – Utrecht University -Different dynamics may lead to emotional bookkeeping: The effect of bond formation and maintenance characteristics on within group differentiation of relationship quality	
10.20-10:40	Mirjam Borger – University of Groningen - The effects of status signals and juveniles on territorial defence in the black-crested titmouse ( <i>Baeolophus atricristatus</i> )	
10:40-11:00	Coffee	Tweede lounge
11:00-11.20	Barbara Helm – University of Groningen - Biological rhythms of natural organisms: birds in human chronoscapes	Abdijzaal
11.20-11.40	Andrea Constanzo – University of Groningen - Causes of changes in darkness in flocks of starlings	
11.40-11.55	Thomas Verschut - University of Groningen - Scaling the interactive effects of attractive and repellent odours for insect search behaviour	
11.55-12.10	Tom Roth – Utrecht University - Social vigilance of friends and foes in zoo-housed western lowland gorillas	
12.10-12.20	Maaïke Griffioen – University of Antwerp – Handicapping males negatively affects the alternation of provisioning visits in blue tits	
12:20-13:30	Lunch	Restaurant

13:30-14:30	Poster session	Tweede lounge
	<b>Animal welfare</b>	Abdijzaal
14:30-15:15	Bas Rodenburg - Utrecht University - Assessing animal welfare: can we ask the animal through sensor-based approaches?	
15:15-15:30	Antoine Leduc - Universidade Federal do Rio Grande do Norte - Out-of-the-blue: Terrestrial sound pollution impacts marine fauna	
15:35-15:50	Gabrielle Winandy - University of São Paulo - Urban noise levels shift the trade-off between song frequency bandwidth and syllable diversity in a Neotropical songbird	
15:50-16:00	Estefania Velilla – Vrije Universiteit Amsterdam - Effect of wind on tremulatory behavior of a Neotropical katydid: Copiphora brevirostris	
16:00-16:15	Coffee	Tweede lounge
16:15-16:25	Quanxiao Liu – Leiden University - How do rearing background noise levels affect spatial preferences for quiet versus noisy in birds?	Abdijzaal
16:25-16:45	Hans Slabbekoorn – Leiden University - Global change in underwater sound levels: opportunity for fundamental and applied science	
16:45-18:15	NVG general meeting	
18:15-20:00	Dinner	Restaurant
	<b>Keynote lecture</b>	Abdijzaal
20:00-21:00	Chair: Tom Wenseleers Stefano Nolfi, CNR Rome.	

	Evolution of collective behavior in robots	
21:00-23:30	Drinks sponsored by Noldus Information Technology + Bowling competition	Bowling

**Friday November 30**

	<b>Evolution of cooperation and self-organization in biological systems</b>	Abdijzaal
	Chair: Tom Wenseleers	
9.00-9.25	Jean-Louis Deneubourg – ULB – A step beyond aggregation	
9.25-9.50	Charlotte Hemelrijk – University of Groningen - Dynamics of intersexual dominance and adult sex-ratio	
9.50-10.10	Tom Wenseleers - University of Leuven - The evolution of self-organized division of labour investigated using simulated robot swarms	
10.10-10.25	Piet van den Berg – University of Leuven - Human cooperation and social heuristics	
10.20-10:40	Sonja Vernes - Max Planck Institute for Psycholinguistics – Title follows	
10.40-11.00	Coffee/ checkout	Tweede lounge
	<b>Communication</b>	Abdijzaal
	Chair: Ruud van den Bos	
11.00-11.45	Christian Tudorache - Leiden University – Coping with the Clock - Biological clock function is linked to proactive and reactive	

	personality types	
11.45-12.05	Marc Naguib – Wageningen University - Why do birds sing?	
12.05-12.15	Simon Ralph – Vrije Universiteit Amsterdam - Finding flowers at night; insights into the sensory world of nectar-feeding bats	
12.15-12.40	Bawan Amin – University College Dublin - Personality of wild fallow deer fawns ( <i>Dama dama</i> ) during the first weeks of life	
12:45-13:40	Lunch	Restaurant
13:40-14:00	Prizes for best student talk and best student poster	Tweede lounge
14:00	End of meeting	

### **Poster Presentations**

#### Thursday

- Claudia Vinke
- Brenda de Groot
- Wang Xiacui
- Elodie Wilwert
- Joris Koene
- Jing Wei
- Yoran Gerritsma
- Yena Kim
- Jeroen van Rooijen
- Annebelle Kok
- Jeroen Hubert
- Yuqi Wang

## Program 2018

### **Abstracts of talks**

#### **Comparative Economics: Using economic paradigms to better understand the evolution of primate cooperative decision-making**

Sarah F. Brosnan, Professor of Psychology, Philosophy and Neuroscience, Georgia State University

Humans routinely confront situations that require coordination between individuals, from mundane activities such as planning where to go for dinner to incredibly complicated activities, such as international agreements. How did this ability arise, and what prevents success in those situations in which it breaks down? To understand how this capability has evolved, my lab has used the methodology of experimental economics in order to address these questions comparatively across the primates. Experimental economics is an ideal mechanism for this approach, as it is a well-developed methodology for distilling complex decision-making in to a series of simple decision choices, allowing these decisions to be directly compared across species and contexts. We have used this approach to investigate decisions related to coordination, anti-coordination and cooperation in New World monkeys, Old World monkeys, and great apes, including humans, using games such as the Assurance Game, the Hawk Dove Game, and the Prisoner's Dilemma Game. We find that there are remarkable continuities of outcome across the primates, including humans, especially in the case of coordination. However there are also important differences in the mechanisms that each species uses to reach these outcomes, and humans are uniquely able to find cooperative outcomes even in situations of conflict. I consider both the similarities and differences and what these can tell us about how cooperative decision-making evolved in the primates.

## **Social information use in an unpredictable habitat. A case study on wild zebra finches**

Hanja Brandl, University of Hamburg

Hanja B. Brandl - Institute of Zoology, Universität Hamburg, Martin-Luther-King Platz 3, 20146 Hamburg, Germany; Department of Biological Sciences, Macquarie University, Sydney, NSW 2109, Australia.

Simon C. Griffith - Department of Biological Sciences, Macquarie University, Sydney, NSW 2109, Australia.

Damien R. Farine - Department of Collective Behaviour, Max Planck Institute for Ornithology, Universitätsstrasse 10, 78457 Konstanz, Germany; Chair of Biodiversity and Collective Behaviour, Department of Biology, University of Konstanz, Universitätsstrasse 10, 78457 Konstanz, Germany; Edward Grey - Institute of Field Ornithology, Department of Zoology, University of Oxford, South Parks Road, Oxford OX1 3PS, United Kingdom.

Toni Laaksonen - Section of Ecology, Department of Biology, University of Turku, 20014 Turku, Finland.

Wiebke Schuett - School of Life Sciences, University of Sussex, Falmer, Brighton BN1 9QG, United Kingdom.

Prospecting on the breeding site of others to assess habitat quality has mostly been described in highly seasonal environments. Zebra finches are a well-studied model species in captivity, but in the wild they breed in variable ecological contexts and in large social groups, suggesting the capacity for interesting social information transfer through nest prospecting.

In an extensive two-year field study, we used correlational and experimental approaches to characterize how pit-tagged wild zebra finches prospect at the nests of conspecifics. We followed 239 breeding attempts and detected nearly 10,000 visits by adult conspecific prospectors. We describe the prospecting patterns in the light of ecological conditions and present experiments giving insights on the mechanism and function of prospecting. Using social network analysis, we further show that stable long-term social ties exist between individuals across contexts and discuss the role of sociality in social information transfer.

## **Handicapping males negatively affects the alternation of provisioning visits in blue tits**

Maaïke Griffioen, University of Antwerp

Maaïke Griffioen - University of Antwerp

Arne Iserbyt - University of Antwerp

Wendt Müller - University of Antwerp

Parents of biparental bird species have a conflict about how much each should invest into the current brood. A recent intriguing theory suggests that parents might ameliorate this conflict via

alternation of their provisioning visits facilitating equal investment. A handful of studies have shown that some species do actively alternate. However, experimental studies proving whether alternation is actually a stable behavioural strategy, are still lacking. In this study, we handicapped male blue tits (*Cyanistes caeruleus*) by feather clipping and recorded the parental responses of both male and female. In particular, we investigated whether males kept the alternation level stable regardless of their handicap. However, the alternation level was lower when the male was handicapped, indicating that pairs exhibit some degree of flexibility in the level of alternation. Interestingly, females with a handicapped partner had a higher visit rate, whilst males in both groups had a similar visit rate.

### **Infanticide risk may determine species-specific stress responses to male introductions in macaques**

Astrid Rox, BPRC; Utrecht University

Astrid Rox, BPRC, Universiteit Utrecht

Linda Hofman, BPRC

Lisette Minderman, Universiteit Utrecht

Jan AM Langermans, BPRC

Liesbeth HM Sterck, BPRC, Universiteit Utrecht

In primates, residents and immigrants experience stress when a new male enters a group. Increased infanticide risk during male immigration is the main cause of stress in females. However, infanticide risk is especially high in a-seasonal breeding species. The female stress response in seasonal breeding species may depend on other factors. We compared the female stress response to male introductions between long-tailed macaques (high infanticide risk) and rhesus macaques (low infanticide risk). Our results show that male introduction was stressful for long-tailed macaques, while the stress response in rhesus macaques was lower. The stress response in long-tailed macaques depended on social buffering and social behavior linked to anti-infanticide strategies, while there was an effect of kin and baseline stress levels in rhesus macaques. Overall, our results imply that there are species-specific stress responses during male introductions, which are likely related to infanticide risk.

### **Seeing voices: is vocal learning enhanced by multimodal exposure to a tutor?**

Judith Varkevisser, Leiden University

Judith Varkevisser<sup>1</sup>, Ralph Simon<sup>1,2</sup>, Ezequiel Mendoza<sup>3</sup>, Constance Scharff<sup>3</sup>, Wouter Halfwerk<sup>2</sup>, & Katharina Riebel<sup>1</sup>

<sup>1</sup>Institute of Biology Leiden, Leiden University

<sup>2</sup>Department of Ecological Science, VU University Amsterdam

<sup>3</sup>Institut für Biologie, Freie Universität Berlin

Like many signals in animal communication, birdsong is multimodal: sound production is accompanied by beak and body movements. We here investigate the hypothesis that the visual information enhances vocal learning and might explain the difference in learning success after song tutoring only with audio playback versus life social tutoring. This difference is usually thought to stem from the lack of a social component but not assigned to the lack of multimodality. We carried out an experiment in which cohorts of young birds were exposed to a same tutor in one of three conditions: one juvenile could only hear the tutor, one could both hear and see the tutor, and one was housed together with the tutor, being able to hear and see it, as well as socially interact with it. Our results suggest that visual exposure to a tutor has a positive influence on song learning, suggesting that multimodal stimulation per se, independent of, or in addition to, social factors, enhances vocal learning.

**Different dynamics may lead to emotional bookkeeping: The effect of bond formation and maintenance characteristics on within group differentiation of relationship quality.**

Tonko Zijlstra, Utrecht University

Tonko Zijlstra, Han de Vries, Elisabeth H.M. Sterck  
Animal Ecology, Utrecht University

Primates have social bonds that may be stable over a long period of time. This study used the Agent-Based EMO-model that simulates primate social life. A capacity for emotional bookkeeping is required for the emergence of the stable grooming relationships observed in empirical studies. In the EMO-model, relationship quality increases linearly and decreases exponentially, while empirical evidence indicates that it may follow a logistic curve. To investigate whether different dynamics lead to the emergence of stable bonds, several parameters were varied, most importantly the speed with which the partner-specific valuation is established and maintained and the curve that is followed by this valuation. More differentiation between relationships will emerge if stronger bonds are more stable over time and if it takes less effort to reinforce a strong bond than it does to form a new one. Strongly differentiated bonds are especially found when it takes a longer time to form a relationship.

**The effects of status signals and juveniles on territorial defence in the black-crested titmouse (*Baeolophus atricristatus*)**

Mirjam Borger, University of Groningen

Mirjam J. Borger<sup>1,2</sup>, Cameron Dregghorn<sup>2</sup>, Lauren Johnson<sup>2</sup>, Nathaly Salazar<sup>2</sup>, Jan Komdeur<sup>1</sup>, Troy G. Murphy<sup>2</sup>

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Fights with conspecifics may lead to high costs associated with defending a high resource territory. A way to decrease these costs is using status signals. Such signals show the quality of individuals and

can therefore help others to decide to initiate a fight over a resource. We studied the effect of a status signal, the crest length, of the black-crested titmouse on territory defence. We also studied the effect of presence of juveniles on territory defence, since they could socially support the territory owner, either through helping or reducing stress as a consequence of their presence. In a choice experiment we presented two models, one with a regular and one with a shortened crest, to male territory owners. We found that males were more likely to attack the large-crested model, but only when juveniles were present. Juveniles helped defending, suggesting social support. Juveniles supporting adults in a non-cooperative breeding passerine has, to our knowledge, not been shown before.

### **Biological rhythms of natural organisms: birds in human chronoscapes**

Barbara Helm, Groningen Institute for Evolutionary Life Sciences, Groningen University

The timing of behaviour relative to the environment is often decisive for the success of natural organisms. Having recently moved to the Netherlands, I am currently establishing a research programme on biological rhythms and time-keeping of wild animals, in particular birds. With this talk I want to briefly introduce my background and then present research on the chronobiology of birds under urbanized conditions. In cities, where birds are exposed to artificial light at night (ALAN), the timings of dawn song and reproduction are usually advanced compared to those of their rural conspecifics. Given these obvious changes, it is important to know whether behaviour under ALAN continues to be in tune with the birds' biological rhythms and physiology. I will approach this question showing data from experimental and observational studies from wild and captive Great tits (*Parus major*).

### **Causes of changes in darkness in flocks of starlings**

Andrea Costanzo, Groningen Institute for Evolutionary Life Sciences, Groningen University

A. Costanzo, H. Hildenbrandt, C. K. Hemelrijk

The coordinated motion of large flocks of starlings fascinates layman and scientists from different fields. During their aerial displays, the darkness of the observed image of the flock often changes. The causes are unknown. The aim of the present study is to investigate potentially underlying processes that may cause changes in darkness by relating these to positions and orientations of birds and of flocks. We use a computational model of flocks of starlings that resemble empirical data in respect to several quantities and properties of the motion of the flock and its individuals. We show that changes in darkness are mostly due to the surface of wings that is exposed to the observer and that darkness is lower when flocks turn. This happens since birds roll into turns, reducing the surface exposed to the observer. Remarkably the darkness does not depend on density of the flock and its orientation relative to the observer.

### **Scaling the interactive effects of attractive and repellent odours for insect search behaviour**

Thomas Verschut, Groningen Institute for Evolutionary Life Sciences, Groningen University

Many organisms need to navigate through mixtures of different odours before they can find their resources. Especially for insects, mixtures of attractive and repellent odorants can have strong effects on their ability to find food or oviposition sites. While mixtures of unattractive odorants have long been used to prevent insects from using resources with an economic importance, the general principles underlying the interactive effect of attractants and repellents on search behaviour are relatively poorly understood. Therefore, we used *Drosophila melanogaster* to measure the attraction to mixtures of attractants and repellents in a wind tunnel. We used our results to determine how the integration of conflicting olfactory signals affect insect search behaviour. We show what happens when the response to a resource depends on the ratio of the attractant to the repellent, on the absolute amount of either odorant, or on an interactive effect between the attractant and repellent.

### **Social vigilance of friends and foes in zoo-housed western lowland gorillas**

Tom Roth, Utrecht University

Tom S. Roth (Animal Ecology, Utrecht University, Utrecht, The Netherlands)

Elisabeth H. M. Sterck (1. Animal Ecology, Utrecht University, Utrecht, The Netherlands. 2.

Biomedical Primate Research Center, Rijswijk, The Netherlands)

Social vigilance is an important mechanism to reduce harassment by others. Therefore, subordinates are often more vigilant than dominants in despotic species (aggression prevention hypothesis). Alternatively, individuals may be vigilant towards non-affiliative conspecifics, as risk of escalated aggression with them is higher (unpredictability hypothesis). These hypotheses were tested in a western lowland gorilla group at Apenheul Primate Park. We took focal observations of agonism, affiliation, and vigilance intensity during approaches. In line with the aggression prevention hypothesis, aggressive individuals were monitored more intensely. In addition, consistent with the unpredictability hypothesis, individuals with affiliative relationships monitored each other less intensely. Our results indicate that vigilance intensity is linked to both agonistic and affiliative relations. Future studies should investigate whether affiliation also influences social vigilance in despotic species.

### **Calling in the heat: the zebra finch incubation call depends on heat but not reproductive stage**

Callum McDiarmid, Macquarie University

Callum S McDiarmid (1), Marc Naguib (2) and Simon Griffith (1)

1. Department of Biological Sciences, Macquarie University

2. Behavioural Ecology Group, Department of Animal Sciences, Wageningen University

Environmental conditions during early development, can profoundly impact an organism's phenotype. It was recently suggested that at high temperatures zebra finch parents use acoustic signals ( incubation calls or v-calls ) to adaptively alter offspring development for hot conditions. We used audio recordings from within wild zebra finch nest-boxes, and of nonbreeding captive zebra

finches experimentally exposed to heat, to characterize the circumstances under which v-calls are produced. V-call incidence was positively related to ambient temperature in the wild and captivity, confirming that v-calls are temperature dependent. However, v-calls were not limited to late incubation and were instead produced throughout incubation and chick rearing in the wild, and by nonbreeding captive adults. While embryos may gather climatic information from this call, it is produced over a range of conditions so is unlikely to be a specifically evolved signal for offspring programming.

### **Assessing animal welfare: can we ask the animal through sensor-based approaches?**

Bas Rodenburg, Utrecht University

Bas Rodenburg is Professor in Animal Welfare at the Department of Animals in Science and Society (DASS) of the Faculty of Veterinary Medicine of Utrecht University in The Netherlands. He is also guest researcher at the Adaptation Physiology Group of Wageningen University. He coordinates research and education in animal welfare. The research of Bas Rodenburg aims at improving the methodology for assessment of animal welfare. He mainly wants to focus on behavioural indicators and methods where the animals themselves are 'asked' how they experience their living conditions. A second important area is the study of behaviour and welfare of individual animals housed in social groups. Bas Rodenburg obtained his PhD on feather pecking in laying hens in Wageningen in 2003 and since then he has been mainly involved in farm animal behaviour and welfare. In his current position, his research is broadening out and also focusing on more general concepts in animal behaviour and welfare. He is currently President of the International Society for Applied Ethology (ISAE; 2017-2019), member of the Editorial Boards of the journals *Applied Animal Behaviour Science* (Review Editor), *Animal Welfare* (Section Editor Poultry), and *Poultry Science* (Section Editor *Animal Well-Being and Behavior*). Bas is Vice Chair of the EU COST Action GroupHouseNet (2016-2020), focusing on solutions for tail biting in pigs and feather pecking in laying hens. He is also involved in the EU COST Action KeelBoneDamage (2016-2020), aiming to find solutions for the problem of keel bone fractures in laying hens.

### **Out-of-the-blue: Terrestrial sound pollution impacts marine fauna**

Antoine Leduc, Universidade Federal do Rio Grande do Norte

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Antoine Leduc (1), Hans Slabbekoorn (2), Gabrielle Winandy (3), André Luiz Serra Quadros (4), Rachid Cassio (4), José de Anchieta CC Nunes (5)

Decades of research have provided pivotal insights regarding the propagation and impacts of anthropogenic sounds in air and water. However, most of humanity has settled and has activities on coastal land, and while coastal marine ecosystems face the impacts of many land-based disturbances, sound pollution from land into water has not yet been considered a stressor to the adjacent seascape. During the World's biggest street festival, we recorded the subaquatic soundscape in adjacent shallow reefs, and quantified the abundance, feeding, territorial and antipredator behavior in the Brazilian damsel (*Stegastes fuscus*). Within these reefs, the intensities of mid- and low-frequency sounds (40-800 Hz, to which fish are sensitive) measured during carnival were as much as eight times those of baseline conditions. Alongside, Brazilian damsels significantly reduced their feeding, retreated to shelter more frequently, but fled from a model fish predator at shorter distances in this noisy context.

### **Urban noise levels shift the trade-off between song frequency bandwidth and syllable diversity in a Neotropical songbird**

Gabrielle Winandy, University of São Paulo

Winandy GSM 1,2,\* , Félix RP 2, Sacramento RA 2, Mascarenhas R 2, Batalha-Filho H 2,3, Japyassú HF 2,3, Izar P 1, Slabbekoorn H 4.

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2 Instituto de Biologia, Universidade Federal da Bahia, Salvador, Brazil.

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4 Institute of Biology, Leiden University, Leiden, The Netherlands.

Anthropogenic noise can interfere with animal communication through signal masking. Acoustic signals show noise-dependent changes in spectral and temporal parameters, which may yield masking avoidance. However, this apparent adjustment strategy may also have a drawback on signal quality, constraining other acoustic parameters that might carry information about the sender. We investigated whether noise-dependent reduction in frequency bandwidth or song duration restricted syllable diversity in a Neotropical songbird, the bananaquit (*Coereba flaveola*). We show that bananaquits sing higher frequency songs, of narrower bandwidth, in noisier territories, independent of territory density, without change in song duration. The spectral adjustment was correlated to a lower number of syllable types in songs. This may reflect a functional trade-off between audibility and signal value. Consequently, noise may not only shape acoustic diversity but also curb sexual selection in urban environments.

## **Effect of wind on tremulatory behavior of a Neotropical katydid: *Copiphora brevirostris***

Estefania Velilla, Vrije Universiteit Amsterdam

Estefania Velilla = Vrije Universiteit Amsterdam

Matias Muñoz = Universidad de Chile

Laurel Symes = Dartmouth College

Hannah ter Hofstede = Dartmouth College

Wouter Halfwerk = Vrije Universiteit Amsterdam

The Neotropics is a very noisy place during the rainy season, bringing high winds and heavy rain. Wind is considered the major source of environmental noise for invertebrates communicating with vibrations. Some Neotropical katydids use complex tremulations during courtship. These tremulations evolved as a response to strong predation pressure from eavesdropping bats. While tremulatory signals have a low frequency range that places katydids out of a bat's reception radar, they can easily be masked by noise in their natural environment. In this study we look at the effects of wind on the tremulatory behavior of *Copiphora brevirostris*. We exposed pairs to wind and recorded their tremulations overnight. We found that wind partially affected the tremulatory behavior of katydids, affecting the onset, but not the amount of tremulations produced. We argue that the observed behavior is not induced by masking avoidance, but likely reflects an anti-predator response to bat wingbeat airflow.

## **How do rearing background noise levels affect spatial preferences for quiet versus noisy in birds?**

Quanxiao Liu, Leiden University

Quanxiao Liu, IBL, Leiden University;

Hans Slabbekoorn, IBL, Leiden University;

Katharina Riebel, IBL, Leiden University;

Worldwide traffic noise increasingly University non-urban areas and might have detrimental effects on wildlife. Highway traffic noise, for example, has been found to be associated with decreases in density and diversity in avian populations. But is this decrease due to traffic associated habitat deterioration or active noise avoidance?

To test whether birds show active avoidance of traffic noise when given a choice between two otherwise identical locations, we offered small flocks of zebra finches a chance to fly back and forth between aviaries with traffic noise recorded at different distances from highways. Subsequently, test birds were experimentally paired and assigned to breed under either high or moderate levels of traffic noise. Their offspring were also tested for noise avoidance behaviour. I will present the comparisons between the birds of both generations and of different rearing noise treatments and discuss the results and their implications.

## **Global change in underwater sound levels: opportunity for fundamental and applied science**

Hans Slabbekoorn, Leiden University

The world has always been full of sounds of abiotic and biotic origin. Animals have much to learn about the surrounding environment through these sounds if they are detected, discriminated, and recognized. I will address the acoustic ecology of the modern world in which man-made sounds have become very prominent affecting animals in various ways. Noisy conditions may hinder auditory perception while hearing adaptations allow coping under acoustically challenging conditions. Man-made sounds can cause damage to the inner ear and also how sound propagates plays a critical role in the potential for impact on animals that live in diverse environments, in air but especially in water. The facts that still little is known about the acoustic world underwater, and that industrial activities are often noisy and require permits and sometimes mitigation, provide plenty of opportunity for fundamental and applied science.

### **Evolution of collective behavior in robots**

Stefano Nolfi, CNR Rome

Evolutionary robotics is a methodology for synthesizing artificial agents (robots) capable to adapt to their task/environment through an evolutionary process. From an engineering perspective this method constitutes a promising alternative for the design of effective autonomous robots. From a modelling perspective it constitutes a new method for studying natural evolution and the emergence of adaptive behavior that presents advantages with respect to other related methods (e.g. evolutionary game theory). After briefly describing the approach I will review a series of experiments that address the evolution of collective behavior and that has been used to study the evolution of cooperation, communication, and reciprocity.

Stefano Nolfi is a research director of the Institute of Cognitive Sciences and Technologies of the Italian National Research Council and head of the Laboratory of Autonomous Robots and Artificial Life. Stefano conducted pioneering research in Artificial Life and is one of the founders of Evolutionary Robotics. His main research interest is in study of how embodied and situated agents can develop behavioural and cognitive skills autonomously by adapting to their task/environment. Stefano authored and co-authored more than 150 peer-review scientific publications including a monograph book on Evolutionary Robotics published by MIT Press in 2000 and an edited book on Evolution of Communication and Language in Embodied Agents published by Springer Verlag in 2010. He coordinated and participated to several research projects founded by international agencies including: the European Science Foundation Project on Hierarchical Heterogeneous Swarm (H2Swarm), the EU-FP7 Integrated Project on Transfer of Action and Language Knowledge in Robots (I-TALK), the EU-FP7 Strep Project on Towards Humanoid Robotic Swarms (SWARMANOID), EU-FP6 Integrated Project on Embodied and Communicating Agents (ECAgents), the EU-FP5 Strep Project on Swarms of Self-Assembling Artifacts (SWARM-BOTS).

### **Title coming soon**

Jean-Louis Deneubourg, ULB

A Step Beyond Aggregation:

Many disciplines are concerned with the links between different levels of observation. This is especially the case for the biology of societies where the relation between the individual behaviour and the dynamics of the society is a key question. Gregarious arthropods (e.g. cockroach) are

subjected to various feedbacks leading potentially the group to adopt specific spatio-temporal configurations and to produce collective responses among which collective memory. Very often however, the idea that collective behaviours arise from a limited number of simple rules is predominant and that the complexity of individual units is underestimated. It seems natural therefore to put back the individual complexity into the dynamics of the society. Based on experimental and theoretical approaches, we will discuss how the feedback networks and individual capabilities affect the global dynamics and the diversity of collective responses using cases from gregarious insects.

### **Dynamics of inter-sexual dominance and adult sex-ratio**

Charlotte Hemelrijk, University of Groningen

C. K. Hemelrijk

Theoretical Research in Evolutionary Life Sciences, TRÉS

Faculty of Science and Engineering, FSE

Groningen Institute for Evolutionary Life Sciences

University of Groningen

In a social system of animals the inter-sexual dominance hierarchy is important. In group-living primates females are often supposed to be subordinate to males, because they are usually smaller than males. This ignores the working of the self-reinforcing effect of winning and losing fights, the winner-loser effect, implying that after losing a fight the loser is more likely to lose again and vice versa for the winner. In a theoretical study of it, we show that when aggression is fierce rather than mild, some males sink low in rank due to the severity of injuries received; over these females become dominant; when the proportion of males in a group is higher, females dominate more males. We confirm the generality of this phenomenon in macaques, vervet monkeys and capuchin monkeys and in humans. Showing the generalizability of these processes, we urge future empirical studies of inter-sexual dominance of all kinds of animals to take sex-ratio and fierceness of aggression into account.

### **The evolution of self-organized division of labour investigated using simulated robot swarms**

Tom Wenseleers, University of Leuven

Eliseo Ferrante<sup>1,2\*</sup>, Ali Emre Turgut<sup>3</sup>, Edgar Duéñez-Guzmán<sup>1</sup>, Marco Dorigo<sup>4</sup> & Tom Wenseleers<sup>1</sup>

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Division of labor is ubiquitous in biological systems, as evidenced by various forms of complex task specialization observed in both animal societies and multicellular organisms. Although clearly adaptive, the way in which division of labor first evolved remains enigmatic, as it requires the simultaneous co-occurrence of several complex traits to achieve the required degree of coordination. Here I will present some work in which we used simulated teams of robots to show

how the regulatory machinery underlying complex self-organised division of labour can readily evolve from first principles in small incremental steps. The general pattern that we observe is that complex task-partitioned foraging behaviour can evolve quite easily from simpler individualistic foraging patterns that lack any division of labour. The actual mechanisms to achieve self-organized division of labour can vary though and can be based for example on stochastic switching or on stigmergy.

### **Uncertainty about social interactions leads to the evolution of social heuristics**

Piet van den Berg, University of Leuven

Pieter van den Berg<sup>1</sup>

Tom Wenseleers<sup>1</sup>

<sup>1</sup> KU Leuven Lab of Socioecology and Social Evolution, Naamsestraat 59, 3000 Leuven, Belgium

Individuals face many types of social interactions throughout their lives, but they often cannot perfectly assess what the consequences of their actions will be. Although it is known that unpredictable environments can profoundly affect the evolutionary process, it remains unclear how uncertainty about the nature of social interactions shapes the evolution of social behaviour. Here, we present an evolutionary simulation model, showing that even intermediate uncertainty leads to the evolution of simple cooperation strategies that disregard information about the social interaction ( social heuristics ). Moreover, our results show that the evolution of social heuristics can greatly affect cooperation levels, nearly doubling cooperation rates in our simulations. These results provide new insight into why social behaviour, including cooperation in humans, is often observed to be seemingly suboptimal. More generally, our results show that social behaviour that seems maladaptive when considered in isolation. **Incomplete abstract**

### **Title follows**

Sonja Vernes, Max Planck Institute for Psycholinguistics

**Abstract?**

### **Coping with the Clock - Biological clock function is linked to proactive and reactive personality types**

Christian Tudorache, Leiden University

Christian Tudorache is an Assistant Professor at the Institute of Biology in Leiden University, the Netherlands. He studies the link between consistent behavioural (personality) and underlying physiological traits, termed coping styles. Christian studies coping styles in fish, the largest taxonomic group of vertebrates, combining multiple research lines, such as stress coping and the biological clock, but also animal welfare and conservation physiology. In his approach, he is looking at various levels of biological function simultaneously, such as physiology, biomechanics and behaviour. After finishing his undergraduate studies in Nijmegen, The Netherlands, Christian obtained his PhD at Antwerp University, on the topic of ecophysiology and swimming energetics of migrating fishes.

After a postdoc position at the University of New Brunswick, CA, he returned to the Netherlands, where he received a NWO-VENI grant to study the migration behaviour and physiology of the elusive European eel. Next to publishing in high-ranking journals and contributing an invited book chapter on volitional locomotion, he is part of the editorial board of Conservation Physiology. He is member of the Society of Experimental Biology, the American Fisheries Society, and the International Society for Fish Endocrinology. Christian participates in the management committees for the COST-actions Conservation Physiology of Marine Fishes (FA1004) and Fitfish (FA1304).

### **abstract**

All vertebrates exhibit physiological responses to a wide variety of stressors. The amplitude and profile of the response depend on the intensity, duration, controllability and predictability of the stressor, but there is also individual variation in the response, termed coping style. A better understanding of the expression of coping styles is of great value for medical applications, animal welfare issues and conservation. Different coping styles are associated with different physiological and behavioural stress responses, especially the cortisol response during the recovery from stress over time, with reactive animals recovering slower from stress than proactive individuals. This and other physiological and behavioural processes in our body are controlled by the biological clock and show diurnal (24-hour) rhythmicity. It is generally accepted that a robust rhythm of these processes is a prerequisite for optimal functioning, and that a lack of rhythmicity can contribute to the pathogenesis of various diseases.

However, we recently found a remarkable individual variation in rhythmicity in a wildtype zebrafish population, at the level of gene expression, hormone levels and locomotor activity. Our data range from robust rhythms with large amplitudes to a complete absence of rhythmicity. Moreover, these clock phenotypes correlate with consistent individual variation in coping styles: proactive fish display a strong diurnal rhythm while reactive fish lack any rhythmicity. We conclude that variation in diurnal rhythmicity is naturally present in wildtype populations, and that a lack of rhythmicity is not necessarily a pathological condition, but an integral part of a reactive coping style.

### **Why do birds sing?**

Marc Naguib, Wageningen University

Marc Naguib<sup>1</sup> Hugo Loning<sup>1,2</sup>, Simon C. Griffith<sup>2</sup>

<sup>1</sup> Behavioural Ecology Group, Wageningen University & Research, The Netherlands

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Birdsong has been key in understanding fundamental principles in behavioural ecology. There is striking evidence that male bird song plays a key role in mate attraction and territory defence and thus is under direct sexual selection. Yet, males often sing at times and at rates where the function is less clear. In zebra finches, *Taeniopygia guttata*, males sing substantially when being exposed to females, yet a lack of data on male singing phenology in the wild hampers a good understanding on the selection pressures on male singing. Here we will present data from laboratory experiments and standardized large-scale field recordings and experiments from a well-studied field population in Australia on male singing activity across various breeding stages and on responses to playback,

providing new insights into the potential function of bird song beyond male attraction and territory defence.

### **Finding flowers at night - insights into the sensory world of nectar-feeding bats**

Simon Ralph, Vrije Universiteit Amsterdam

Authors:

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In tropical South and Central America, some 400 plant species chose a quite rare pollination system: they are pollinated by bats. As bats are active at night, the usual visual flower signals do not work. In the absence of light these plants developed floral reflectors, which reflect the ultrasound signals of bats with a spectral signature, making the flowers acoustically conspicuous to the bats. In behavioral experiments we could show that such acoustic signals can reduce bats' search time for flowers by up to 50%. This reduction in search time is crucial for the bats as they have to find and revisit several hundred flowers each night to fulfill their energetic needs and for the flowers it ensures cross pollination. We also mimicked the bats search behavior following the approach of synthetic psychology, where a natural system is modeled by a technical setup. This approach proved as a very potent tool in the quest of gaining new insights into the sensory world of bats.

Bawan Amin – University College Dublin - Personality of wild fallow deer fawns (*Dama dama*) during the first weeks of life

### **Personality of wild fallow deer fawns (*Dama dama*) during the first weeks of life**

Bawan Amin, University College Dublin

Bawan Amin, University College Dublin

Simone Ciuti, University College Dublin

Individual animals show consistent differences in behaviour which are referred to as personality traits. Despite the growing body of literature, most of the personality research has been focusing on captive populations often monitored in very controlled environmental conditions (e.g., labs), with an

impressive scarcity of longitudinal studies which are necessary to tackle personality consistency and development from early stages of maturity to senescence. Here, our aim was to study inter-individual variability in behaviour of newborn fallow deer fawns in the wild. We captured and ear-tagged 102 wild individuals and we measured their behavioural reaction before, during, and after handling. Forty-four fawns were recaptured, allowing us to compute repeatability estimates. We show that fawns display consistent inter-individual differences in behaviour and with that, we set the stage for longitudinal studies of animal personality in a wild social mammal.

## **Abstracts of Posters**

### **The importance of early life experiences for the development of behavioural disorders in domestic dogs**

Claudia Vinke, Faculty of Veterinary Medicine, Utrecht University

L. Dietz (DP), A.K. Arnold (DASS), V.C. Goerlich-Jansson (DASS) & C.M. Vinke (DASS).

DASS = Department Animals in Science & Society, fac. of Veterinary Medicine, UU.

DP = Department Pathobiology, fac. of Veterinary Medicine, UU.

Aggression, anxiety and separation related behavioural disorders are commonly seen in pet dogs worldwide, with a high impact for dog welfare, the human-dog bond and safety in society. Behavioural disorders are an important cause for sheltering and euthanasia requests.

In early life, maternal care, mother-pup attachment and the sensitive period for socialisation contribute to shaping the neuronal and behavioural profiles of an individual. Proper stimulation during this period is essential for normal behavioural development. However, these conditions are absolutely lacking in e.g. puppy mills and commercial dog trade.

This poster presents a summary of the results of a literature review aiming to elucidate the importance of early life experiences for the development of behavioural disorders in dogs.

### **Humble mysteries: studying the unknown lives of leaf-eating monkeys**

Brenda de Groot, Oxford Brookes University

Brenda de Groot

Primate Conservation, Oxford Brookes University

De Groot, Brenda (1) and Nekaris, Anna (2)

1. Jansstraat 71E, 2011 RV, Haarlem, The Netherlands.
2. Anthropology Centre for Conservation Environment and Development, Oxford Brookes University, Oxford OX3 0BP, UK.

The Asian colobines are a colourful and ecologically diverse group of leaf-eating monkeys. Unfortunately, many species are threatened with extinction and yet remain largely unstudied. The Germain's langur (*Trachypithecus germaini*) is one of these monkeys, that despite being Endangered

received little research attention, which hampers suitable conservation action for the dwindling population. In this study, I present the first data on the ecology of semi-free ranging *T. germaini*, housed in a 3000 m<sup>2</sup> naturalistic enclosure near Siem Reap, Cambodia. I analysed their daily activity budget, activity pattern, forest strata use and the influence of weather on their behaviour. I additionally observed mycophagy (consumption of mushrooms) and geophagy (consumption of soil). I discuss the ecological correspondence and inconsistencies with other captive and wild *Trachypithecus* species, and conclude with the implications for their conservation.

### **Food-dependent divergent adaptation in *Drosophila melanogaster***

Wang Xiaocui, University of Groningen

Xiaocui Wang, Jean-Christophe Billeter, Martine Maan  
Groningen Institute for Evolutionary Life Sciences  
University of Groningen

Sensory drive, a hypothesis about how different mating traits adapt to local environments, link divergent selection with reproductive isolation and provide a potential mechanism for the evolution of reproductive isolation between diverging populations. In our project, we plan to explore the role of sensory divergence in reducing gene flow between populations exploiting alternative food resources by using *Drosophila*-yeast model. Yeast is required for *Drosophila* life since it completes the fly medium through providing the amino acid, fatty acid, vitamin and sterols which are absent in natural fly food. Other than direct nutritional benefits, yeast can also purify and process the environment the flies live and provide reliable cues about the environment for flies. Therefore, with this strong interaction between yeast and *Drosophila*, we hypothesize that yeast will drive the differentiation between populations that exploit alternative yeast species.

### **Phenotypic plasticity and species divergence**

Elodie Wilwert, University of Groningen

Phenotypic plasticity, the ability to develop distinct phenotypes without genetic changes, is a key determinant of individual performance and ecological interactions: allowing a fast adjustment to environmental variation. However, its evolutionary impact is under debate, especially its role on taxonomic diversity: On the one hand plastic responses might promote species divergence: they facilitate colonization of new habitats, exposing organisms to new selective pressures initiating genetic divergence which might lead to the formation of new species. On the other hand, it might inhibit speciation: it weakens the strength of selection for genetic divergence. However, empirical data giving evidence for the impact of phenotypic plasticity on species divergence are lacking. We aim to address this problem by determining the role of visual plasticity in species divergence in East African cichlid fish, using experimental manipulations at the individual level and comparative analysis.

### **Cracking the egg pheromone**

Joris Koene, Vrije Universiteit Amsterdam

Adam van Klaveren, Tjalf Wouda, Marine Vinot, Sebastiaan Rückert, Erik Bloem and Joris M. Koene

Department of Ecological Science, Faculty of Earth and Life Sciences, VU University Amsterdam, The Netherlands

Animals have various ways of finding mating partners and suitable places to reproduce. When visual and auditory senses are limited, animals rely heavily on their tactile and olfactory senses. For long-distance communication in such animals, olfactory senses and pheromone detection are therefore essential and highly effective. While Gastropods rely heavily on olfactory and tactile information, relatively little is known about the cues involved. Therefore, in the presented experiments we used the simultaneously hermaphroditic freshwater snail *Lymnaea stagnalis* in order to get a better sense of its use of pheromonal cues. We focused on a specific type of pheromonal information, being emitted by freshly laid eggs, and demonstrate that this is attractive to adult conspecifics but does not induce egg laying directly in those individuals. Nevertheless, observations on grouped snails show that they do tend to lay their eggs in clusters. After also having identified the female egg-packaging g ?

### **Is there generalisation to songs in zebra finches preference learning?**

Jing Wei

Jing Wei, Katharina Riebel

Generalisation is the process that a learned response to a specific stimulus will also occur in response to sufficiently similar novel stimuli. There are increasing reports of learned mating preferences across species and modalities, but apart from visual imprinted preferences, the process of generalisation has not been studied systematically in the context of mating signals. Female zebra finches are known to prefer songs heard early in life (from their father or other adult tutor) over unfamiliar songs. Here we report and discuss results of an experiment that tested whether early learned preferences are generalised to novel songs with similar features. As adults, females were given a choice to trigger playbacks of either their father's song, an unfamiliar song, or an unfamiliar songs with 66% and 33% syllables replaced with syllables originated from the subject's father's song. The results will be compared with predictions arising from learning theory and earlier work in this species.

### **Parsing the Developmental Plasticity of Personality in Zebra Finches - Project Outline**

Yoran Gerritsma, University of Groningen

Y. H. Gerritsma

S. Verhulst

In wildlife, human, and laboratory animal populations, considerable variability exists among individuals in their trait-like patterns of behavioural and physiological responses to salient environmental challenges and opportunities. This individual variation in so-called personalities (also temperament or coping style)

has important functional consequences in terms of fitness of the individual. It remains largely unknown

how plastic certain personality traits are during an individual's lifetime and we aim to understand the

proximate neuromolecular determinants of personality differences.

In the current project we will investigate the effect of early developmental environment manipulations

on (1) avian personality traits including sociality in adulthood and (2) selective neuromolecular mechanisms underlying the behavioural expressions of personality.

### **Measuring Implicit Associations with a Pictorial IAT: Implications for Comparative Psychology**

Evy van Berlo, Leiden University

E. van Berlo (1,2), M. Otten (3), E. van der Ven (1,2), M. E. Kret (1,2)

1. Leiden University, Institute of Psychology, Cognitive Psychology Unit, Leiden, The Netherlands

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3. University of Amsterdam, Department of Brain & Cognition, Amsterdam, The Netherlands

The Implicit Association Test (IAT) is frequently used to measure implicit associations, but our understanding of the foundations and universality of these associations is still limited. It is therefore imperative to test a wider variety of populations, including non-human animals, but current IATs require language comprehension. We therefore designed a self-explanatory, touchscreen-based pictorial IAT and tested racial attitudes towards Moroccan and Dutch individuals in 129 Dutch adults and in 143 Dutch children visiting a zoo. D-score calculations showed that both adults and children tend to associate Moroccan faces with negative images, and Dutch faces with positive images. Results indicate that the P-IAT taps into the same implicit attitudes as its verbal counterparts. Ultimately, we hope the P-IAT provides a new method for studying implicit attitudes in apes or other animals, something that to date has not been investigated.

### **Familiar vs. unfamiliar human face recognition in chimpanzees**

Yena Kim, Leiden University

Yena Kim (the Institute of Psychology, the Cognitive Psychology Unit, Leiden University)

Jae Chun Choe (Research Institute of EcoScience, Ewha Womans University, Seoul, Republic of Korea)

Previous research on chimpanzee face recognition have reported an important role of eyes in conspecific face matching experiments. However, recent studies using an eye-tracker have revealed an inconsistent pattern in which they focus more on nose and mouth regions. Furthermore, no studies have yet tested whether chimpanzees process familiar and unfamiliar faces differently. The current study was designed to investigate the relative contribution of facial components (eyes, nose, mouth) in familiar vs. unfamiliar human face recognition in chimpanzees. Five chimpanzees at Primate Research Institute, Japan have participated in a series of face matching experiments.

Preliminary data analysis indicates that chimpanzees are more accurate and faster in recognizing familiar human faces than unfamiliar faces. Contrary to the conspecific face recognition, the mouth seems to play a more significant role in human face recognition by chimpanzees.

### **Male broiler breeder declawing and balance during copulation.**

Jeroen van Rooijen, former Centre for Applied Poultry Research "Het Spelderholt."

Broiler breeders want a lot of eggs from which fast growing chicks hatch. Lighter hens lay more eggs, broad and heavy males deliver growth potential. This may result in male balance loss, in female femur damage, female copulation avoidance and low fertility. To avoid femur damage males are declawed. The influence of declawing, male body weight and female plumage condition on balance was tested. No femur wounds were found. Heavier males started more copulations (sign). No difference in loss of balance between heavier and lighter males was present. However, the heavier males interrupted copulations more often. Nevertheless, there was a tendency to more successful copulations by heavier males (ns). Declawed males had a tendency to show more loss of balance than males with intact toes (ns). Well-feathered hens copulated more with declawed males (sign). Hens without feathers were hardly copulated. Conclusion: Heavier males performed more sexual behaviour. Declawing had a positive effect.

### **Effects of noise on predator-prey interactions in harbour porpoises and sand gobies**

Annebelle Kok, Leiden University

Annebelle Kok (Leiden University)

Pam Engelberts (Leiden University)

Kirsten Timmerman (Leiden University)

Jan Lankhorst (Leiden University)

Ronald Kastelein (Seamarco)

Lean Helder-Hoek (Seamarco)

Shirley van der Voorde (Seamarco)

Fleur Visser (UvA, NIOZ, Kelp Marine Research) &

Hans Slabbekoorn (Leiden University)

Increasing levels of anthropogenic noise in the oceans affect the behaviour of marine organisms. Changes in behaviour that involve inter-species interactions, such as predator-prey interactions, have the potential to cascade through ecosystems. Therefore, it should be a priority of research. Combining experiments with free-ranging and captive animals, we investigated effects of artificially increased ambient noise levels on foraging and spatial behaviour of harbour porpoises, and anti-predator behaviour of sand gobies. The influence of increased ambient noise levels on behaviour was affected by temporal structure and amplitude of the noise, leading to distinct response patterns of predator and prey. Further understanding these patterns is needed to predict the effects of noise on ocean life.

### **Effects of broadband sound exposure on the interaction between foraging crab and shrimp**

Jeroen Hubert, Leiden University

Jeroen Hubert  
James Campbell  
Jordy G. van der Beek  
Manon F. den Haan  
Rik Verhave  
Laura S. Verkade  
Hans Slabbekoorn

Human exploitation of marine resources leads to increasing amounts of anthropogenic sound underwater, which may affect marine life negatively. We conducted experimental trials in the natural conditions of a quiet cove. We attracted shore crabs (*Carcinus maenas*) and common shrimps (*Crangon crangon*) with an experimentally fixed food item and compared trials in which we started playback of a broadband artificial sound to trials without exposure. During trials with sound exposure, the cumulative count of crabs that aggregated at the food item was lower, while variation in cumulative shrimp count could be explained by a negative correlation with crabs. These results suggest that crabs may be negatively affected by artificially elevated noise levels, but that shrimps may indirectly benefit by competitive release. Our results show that moderate changes in acoustic conditions due to human activities can affect foraging interactions at the base of the marine food chain.

## **Title**

Yuqi Wang

Hormone milieu during reproduction is one of the key factors that can influence the trade-off between reproductive investment and self-maintenance. Much of previous work has focused on prolactin as a physiological mediator since prolactin is involved in the onset and maintenance of parental care. However, how the prolactin relates to reproduction in wild populations is rarely investigated. Here we report the prolactin concentrations in breeding Kentish plovers (*Charadrius alexandrinus*) – a small shorebird that exhibits variable mating system and parental care, and thus used as an ecological model system of mating system evolution. Throughout the breeding season, we estimated the circulating prolactin concentrations of male and female plovers during incubation and after hatching of the eggs. In addition, we monitored the behavior of parents and determined the fate of their nest. We found that prolactin increased with clutch completion date, and incubating males and females with high prolactin concentrations invest more in incubation than those with low prolactin concentrations. Importantly, higher prolactin concentrations in either male or female predict higher nest survival. Our results suggest that prolactin is an indicator of parental behavior in a wild shorebird population, although experimental manipulations of prolactin are necessary to verify this relationship.

