

## NVG meeting 2017 program



### 25th Anniversary meeting 29 November - 1 December 2017

#### Wednesday November 29

Time	Activity	Location
9:50-17:00	PhD meeting	Hildegard
17:00-18:00	Registration	Cenakel
18:00-20:00	Dinner	Winter Garden
20:00-21:00	<b>BRILL Baerends lecture</b> – sponsored by BRILL Publishers	Cecilia Chapel
	Chair: Simon Verhulst Ben Sheldon, University of Oxford	
21:00-23:30	Drinks	Winter Garden

#### Thursday November 30

	<b>Behavioural Ecology</b>	Cecilia Chapel
9:00-10:45	Chair: Marc Naguib, Wageningen University	
9:00-9:45	Jeff Podos, University of Massachusetts Amherst	
9.45-10.15	Camilla Hinde, Wageningen University	
10.15-10.30	Jessica van der Wal, University of St Andrews	
10.30-10.45	Thomas Oudman, NIOZ	
10:45-11:05	Coffee	Cecilia Chapel
	<b>Behavioural genetics and epigenetics</b>	Cecilia Chapel
11:05-12:35	Chair: Kees van Oers, NIOO-KNAW	
11:05-11.35	Jean-Christophe Billeter, University of Groningen	
11.35-11.55	Veronika Laine NIOO-KNAW	
11.55-12.10	Kees van Oers, NIOO-KNAW	
12.10-12.30	Tom Wenseleers, KU Leuven	
12:30-13:30	Lunch	Winter Garden
13:30-14.30	Posters	Cecilia Chapel
	<b>Social Cognition/ Group behaviour/ Cross-species interactions</b>	Cecilia Chapel
14:45-16:50	Chair: Mariska Kret	
14:45-15:30	Carsten de Dreu, Leiden University	
15.30-15.45	Estefania Velilla, Free University of Amsterdam	

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15:45-16:00	Albert Bijleveld, NIOZ Royal Netherlands Institute for Sea Research	Cecilia Chapel
16:00-16:15	Coffee	Winter Garden
16:15-16:30	Rolf Storms, University of Groningen	
16:30-16:45	Filipe Cunha, NIOO-KNAW	
16:45-18:15	NVG general meeting	Cecilia Chapel
18:15-20:00	Dinner	Winter Garden
20:00-21:00	<b>25th anniversary lecture</b>	Cecilia Chapel
	Katie Slocombe, The University of York Chair: Liesbeth Sterck, Utrecht University	
21:00-23:30	Drinks sponsored by Noldus Information Technology	Winter Garden

## Friday December 1

	<b>Neuroethology</b>	Cecilia Chapel
9:00-10:50	Chair: Ruud van den Bos, Radboud University Nijmegen	
9:00-9:30	Andrew Straw, University of Freiburg	
9:30-9:55	Christian Tudorache, Leiden University	
9:55-10:15	Jorg Massen, University of Vienna	
10:15-10:35	Sonja Vernes, Max Planck Institute for Psycholinguistics	
10:35-11:00	Coffee	Winter Garden
	<b>Communication</b>	Cecilia Chapel
11:00-12:40	Chair: Simon Verhulst, University of Groningen	
11:00-11:30	Tristram Wyatt, Kellogg College	
11:30-11:50	Wouter Halfwerk, Free University of Amsterdam	
11:50-12:10	Astrid Groot, University of Amsterdam	
12:10-12:25	Annebelle Kok, Leiden University	
12:25-12:35	Michiel Vellema, University of Southern Denmark	
12:35-12:45	Judith Smit, Free University of Amsterdam	
12:45-13:40	Lunch	Winter Garden
13:40-14:30	Posters	Cecilia Chapel
14:30-16:20	<b>Applied behavioural Biology</b>	Cecilia Chapel
	Chair: Sanne Roelofs, Utrecht University	
14:30-14:40	Jerine van der Eijk, Wageningen University	
14:40-14:50	Bawan Amin, Leiden University	
14:50-15:10	Elske de Haas, Wageningen University	
15:10-15:30	Rebecca Nordquist, Utrecht University	
15:30-15:50	Eira Bermúdez Cuamatzin, Leiden University	
15:50-16:00	Prizes for best student talk and best student poster	Cecilia Chapel
16:00	End of meeting - coffee/tea available in the lounge	Winter Garden



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**Abstracts of talks**

**Hypothalamic oxytocin facilitates group-living in humans**

Carsten de Dreu, Leiden University, Social Psychology Department

Oxytocin, a neuropeptide acting as neurotransmitter and hormone, has been implicated in social bonding and empathy in voles, rodents and non-human primates. Here I examine the possibility that oxytocin has a similar function in humans and, more specifically, enables and supports a range of group-serving behaviors. Four group-serving functions are considered and tested in double-blind placebo-controlled oxytocin challenge studies: Conformity and norm-compliance, in-group trust and cooperation, information sharing and joint decision-making, and out-group oriented aggressiveness. Results combined undermine the view of oxytocin as a cuddle chemical and underscore the idea that oxytocin contributes to the evolved capacity in humans to live in, and for their groups.

**The ecology of tool use in New Caledonian crows**

Jessica van der Wal, University of St Andrews

While tool use occurs in a wide range of animal taxa, it is relatively rare. New Caledonian crows are one of only a few species that show routine tool use and manufacture in the wild. Despite nearly two decades of research, little is known on why these birds use tools. Considering the ecological circumstances animals are exposed to is key in explaining how tool use has evolved in certain species and not in others. In an observational study of individually-marked wild crows, I documented the relative calorific gain of foraging with tools and without, finding that tools allow access to more nutritious prey than those available through extractive bill foraging. Crows adopted a range of foraging modes, and may have varied in their degree of tool expression, though this could also be a consequence of human observer presence. This study contributes to a better understanding of the natural history of New Caledonian crows, and of the importance of tool use in their foraging behaviour.

**Movement as an orchestration by the environment: from solitary residents to grouping nomads in one species**

Thomas Oudman

Thomas Oudman<sup>1</sup>, Theunis Piersma<sup>1,2</sup>, Mohamed Vall Ahmedou Salem<sup>3</sup>, Marieke E. Feis<sup>1</sup>, Anne Dekinga<sup>1</sup>, Sander Holthuijsen<sup>1</sup>, Job ten Horn<sup>1</sup>, Jan A. van Gils<sup>1</sup>, and Allert I. Bijleveld<sup>1,4</sup>

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<sup>2</sup> Chair in Global Flyway Ecology, Conservation Ecology Group, Groningen Institute for Evolutionary Life Sciences (GELIFES), University of Groningen, The Netherlands

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Population movement characteristics, such as the degree of aggregation and of site fidelity, are often interpreted as species-specific traits. However, they are the result of individual decisions, informed by the environment. In a study on free-roaming red knots, medium sized shorebirds that feed on molluscs, we measured aggregation and site fidelity in two environments that naturally largely differed in observed resource patch sizes. Red knots aggregated much more where patch sizes were larger. However, this coincided with lower site fidelity, implying that resource density was not limiting aggregation directly. Apparently, red knots switched strategies. These results stress that also in many other cases, supposedly innate population characteristics may in fact be active adjustments to the environment.

**Vocal performance in sparrows: functional and developmental analyses**

Jeff Podos, Department of Biology, University of Massachusetts Amherst, MA, USA

Many animals produce mating displays that are intricate and mechanically demanding. In such cases, theory predicts that other animals should attend to display variations related to performance capacities, and to adjust their own behaviors and choices accordingly. In this talk I will discuss studies of vocal performance in sparrows, in species for which song structure appears limited by motor constraints. I will first discuss two field studies of song function, in chipping sparrows and swamp sparrows, which asked if and how variations in trill rate influenced aggressive responses of territorial males. In both species, responses to song playback were seen to vary with trill rate, and in chipping sparrows trill rate relationships predicted the formation of temporary territorial alliances. I will then discuss two laboratory studies of hand-reared swamp sparrows, concerning the development of song preferences of females, and of song structure of males. These studies provide evidence for i

**Behaviour genetics - the past, the present, the future**

Veronika Laine, NIOO-KNAW

One of the main goals in current behaviour research is to identify genes behind the measured behavioural variations. This is important in order to study how under the influence of the environment, gene expression changes are translated into the observed phenotypes. The advances, especially in genomic technologies, have made it possible to identify genetic loci behind these variations, also concerning non-model species. In this talk, I will describe the role and relevance of molecular genetic approaches in behavioural studies through time. I will 1) review the past methods, 2) provide an overview of the current situation and progress, and 3) explore likely new avenues the field will take.

**Negotiation in parental care - patterns and processes**

Camilla Hinde, Behavioural Ecology Group, Wageningen University & Research

Parents rearing young together must cooperate, but they also each do better if the other does more of the work. They are therefore expected to monitor each others work rate, and the extent of response to this should depend on their partners quality, as well as environmental quality. I will present an overview of parental negotiation, including new work on individual differences and compatibility in parental care.

**Avian Ecological Epigenetics: the role of DNA methylation in the evolution of animal personality**

Kees van Oers

Animal Ecology Netherlands Institute of Ecology (NIOO-KNAW) Wageningen University

Kees van Oers<sup>1</sup>, Eveline Verhulst<sup>1</sup>, Martijn F.L. Derks<sup>1,2</sup>, Kyle M. Schachtschneider<sup>2,3</sup>, Veronika N. Laine<sup>1</sup>, Ole Madsen<sup>2</sup>, Koen J.F. Verhoeven<sup>4</sup>

<sup>1</sup>Department of Animal Ecology, Netherlands Institute of Ecology (NIOO-KNAW) <sup>2</sup>Animal Breeding and Genomics Centre, Wageningen University & Research

<sup>3</sup>Department of Radiology, University of Illinois at Chicago <sup>4</sup>Department of Terrestrial Ecology, Netherlands Institute of Ecology (NIOO-KNAW)

For behavioural geneticists, the search for the hereditary mechanisms underlying quantitative traits traditionally focussed on the identification of underlying genomic polymorphisms such as SNPs, but this has not been very fruitful. It has now become clear that epigenetic mechanisms, such as DNA methylation, can consistently alter gene expression over multiple generations. Non-geneticists found out that these methylation patterns are prone

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to changes and such changes may be transmitted over generations. DNA methylation may therefore be an explanation for non-genetic and genetic inheritance.

In this talk I will present preliminary results on the relative role of induced versus inherited variation in methylation for personality variation in great tits (*Parus major*). The identification of variation in DNA methylation offer a great opportunity to combine genetic and non-genetic studies. Hole-breeding passerines could be ideal ecological model species for studying ecological epigenetics.

### **Different genes influence female pre- and post-copulatory sexual receptivity in *Drosophila melanogaster***

Jenke Gorter and Jean-Christophe Billeter

Groningen University

Female sexual receptivity, the likelihood to accept mating, is critical for reproduction and is determined by a combination of genetics and experience. The precise mechanisms underlying the effect of experience and genetics on female receptivity are, however, poorly understood. The mating behavior of *Drosophila melanogaster* is a model to investigate this as females are sexually receptive when virgin but reduce receptivity once mated showing that sexual experience modulates sexual receptivity. We performed a Genome Wide Association Study showing that the genetic architectures underlying virgin and mated female receptivity are different, indicating that different genes influence pre and post-copulatory receptivity. We then took a single gene approach and show that the Odorant Receptor (OR) Or47b, which senses volatile cues emitted by flies of both sexes, is necessary for mated, but not virgin female receptivity. We then show that the Odorant Receptor Neurons (ORN) expressing Or47b form the main olfactory channel affecting mated female receptivity as females functionally lacking all classical ORs but Or47b have a wild-type receptivity level, while those lacking all ORs have an aberrantly high receptivity. These data indicate that Or47b ORN regulate mated female sexual receptivity through inhibition, a finding supported by the necessity of the inhibitory neurotransmitter GABA in the Or47b ORN. We further uncover that Or88a, an odorant receptor tuned to the same odour as or47b, affects virgin sexual receptivity but not mated female receptivity. We provide a hypothetical model explaining the alternative roles of Or88a and Or47b in virgin and mated females. We have thus pinpointed different genetic bases to female pre- and post-mating sexual receptivity.

### **Sex, lies and Y-chromosomes: the secret love lives of our genealogical ancestors**

Tom Wenseleers

Tom Wenseleers (1), Ronny Decorte (2), Piet van den Berg (1) & Maarten Larmuseau (1,2)

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(2) Forensic Biomedical Sciences, KU Leuven, Kapucijnenvoer 33 building i, box 7001, 3000 Leuven

In many pair-bonding species, fathers may be cuckolded into raising children that genetically are not their own. In human populations, however, the incidence and driving factors of such "extra-pair paternity" (EPP) remain contentious. Here we use a large-scale genetic genealogy approach based on Y chromosomal genotyping to reconstruct spatio-temporal patterns of human EPP rates. Using patrilineal genealogies from the Low Countries spanning a period of over 500 years and Y chromosomal genotyping of living descendants, our analysis reveals that although EPP rates were low on average, they were 4-fold higher and reached 5% among the lower socioeconomic classes in the larger cities of the late 19th century. In addition, EPP rates were found to be higher if the legal fathers could exert less social control by working away from home. Together, these results suggest that human extra-pair paternity varied on relation to its potential benefits, opportunity and prevailing levels of social control.

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**Learning to lead: Exploring the feedback between leadership and learning in homing pigeons *Columba livia***

Allert I. Bijleveld

Allert I. Bijleveld(1,2) and Dora Biro(1)

(1) Department of Zoology, University of Oxford, South Parks Road, Oxford OX1 3PS, UK

(2) NIOZ Royal Netherlands Institute for Sea Research, Department of Coastal Systems, and Utrecht University, The Netherlands

A fundamental question in collective behaviour is how among-individual differences structure animal groups, affect the flow of information, and determine leadership roles. An individual's dominance, personality and experience correlate with leadership. The question that follows is whether variation in these traits is a cause or a consequence of leading. We investigated, in pairs of homing pigeons, whether leadership could facilitate learning a homing task. By pairing a focal bird with a naïve or a highly experienced individual, we manipulated it into a leader or follower role. To quantify learning, we compared the route efficiencies of solo flights preceding and following the leadership manipulation. We found that focal birds paired with naïve partners increased route efficiency more than when paired with experienced partners. These findings show, for the first time, that leadership can cause an increase in knowledge and that there is positive feedback between leading and learning.

**Are plants protecting their herbivore enemies against predation?**

Estefania Velilla

Estefania Velilla; Daniel Commandeur; Hans Cornelissen; Jacintha Ellers; Wouter Halfwerk

All authors are affiliated with the VU University Amsterdam

Predator-prey relationships are in a constant a co-evolutionary arms race where prey strive to remain unnoticed, while predators try to increase prey detection. This is not only driven by the predators and prey, but also by the environment. By mediating information transfer, the environment plays an important role in the way that species interact. Several parasitic wasps use the vibrations produced by chewing caterpillars to identify and locate them. However, variation in the substrate is known to affect the production, transmission and reception of vibrational cues, likely affecting prey conspicuousness. We tested whether plant trait variation results in differences in the vibrational cue of *Spodoptera exigua*. Using laser vibrometry we measured the foraging cues on plant species varying in leaf traits. We found that certain traits attenuate the foraging cues. For parasite-host interactions it could mean that finding a host in a plant species with these traits may be more difficult.

**Collective escape patterns in starling flocks under predation**

Rolf Storms

R. F. Storms, C. Carere, F. Zoratto, C. K. Hemelrijk

University of Groningen; Groningen, the Netherlands, Department of Ecological and Biological Science, University of Tuscia, Viterbo, Italy; National Institute of Health; Rome, Italy

Starling flocks under attack by a raptor, such as a Peregrine falcon, show some of the most complex patterns of collective motion. The complexity concerns the actual social structure, its variation over time and its dependence on the attack by the raptor. Here we present a first step towards unraveling this complexity. We apply a time-series analysis based on video footage of 182 hunting sequences of a falcon on flocks of thousands of starlings above Rome. We show that the main types of collective escape are 'flash expansion', 'blackening', 'agitation wave', 'vacuole', 'cordon' and 'split'. The frequency of different patterns of collective escape is positively associated with the frequency of attack by the raptor. The specific type of collective escape patterns depends on the preceding pattern and on the level of threat posed by the raptor in a similar way as has been found in fish.

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## **Sex and Cooperation: Anti-Predatory Behavior Beyond Avoiding Death**

Filipe Cunha NIOO-KNAW, Department of Animal Ecology

Understanding how animals use antipredatory strategies beyond survival per se has been an overlooked aspect of widespread adaptations. I explore the idea that such behaviors could be used as an opportunity to advertise one's quality in distinct taxa, through: I) a field experiment in a bird community which indicates a female-specific audience effect on males' mobbing behavior; II) a comparative analysis among nonhuman primates which reveals a significant male bias in the expression of anti-predatory behaviors; and III) preliminary results from a study on mobbing across vertebrates which suggests that this pattern is widespread. These findings provide the first empirical evidence for the hypothesis that anti-predatory behaviors can be used as an opportunity to signal phenotypic quality to potential mates. Systematic male bias in the expression of antipredatory behaviors is likely a result of sexual selection, either functioning as costly signaling or as alternative reproductive tactics.

### **Parasite-mediated sexual selection in moths**

Astrid Groot

Astrid T. Groot<sup>1,2,3</sup>, Andrea Barthel<sup>2</sup>, Heike Staudacher<sup>1</sup>, Luuk Reijmers<sup>4</sup>, Vera Ros<sup>4</sup>, David G. Heckel<sup>2</sup>

<sup>1</sup>Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam

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<sup>4</sup>Laboratory of Virology, Department of Plant Sciences, Wageningen University

Parasite-mediated sexual selection has been studied mostly in theoretical models and in fish and birds, i.e. in sexually dimorphic species with visual and acoustic signals, but it remains unclear how parasites affect sexual attraction in sexually monomorphic insects with chemical signals, which comprise the majority of species on earth. We investigate how infections and immune responses affect sexual attraction and reproductive success in moths, where females attract males through sex pheromones. Since males and females differ in their life histories, sex-specific resource investment strategies following an infection can be expected. So far we found that males have higher base-line immunity while females have higher induced immunity, infected females have lower reproductive success while males do not, and infected females are less discriminating between oviposition sites than control females. Our results will be discussed in light of evolutionary forces shaping sexual attraction.

### **Yawn duration predicts neurological measures in birds**

Jorg Massen

Massen, J.J.M. <sup>1</sup>, Hartlieb, M. <sup>1</sup>, Bauer, J. <sup>1</sup>, Leitgeb, E. <sup>1</sup> & Gallup, A.C. <sup>2</sup>

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

<sup>2</sup> Department of Social and Behavioral Sciences, SUNY polytechnic institute, USA.

A contemporary hypothesis states that yawns function to cool the brain. Consequently, it is predicted that the duration of yawns should depict species' neural anatomy. Previous studies on mammals indeed found that mean yawn duration is a robust predictor of brain weight and cortical neuron number. However, it is unclear whether these findings can be generalized to other vertebrate classes. Here, we coded 371 yawns from 155 individuals across 26 bird species and linked the duration of this action pattern to previously published brain measures. Preliminary analyses revealed that mean yawn duration is a significant positive predictor of brain weight and total neuron number and is most strongly related to pallium neuron counts, whereas there was no significant relationship between yawn duration and body weight. These findings support the brain-cooling hypothesis and suggest that yawn duration can be used as a marker of interspecies differences in brain measures across vertebrates.

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### **Coping with the clock**

Christian Tudorache

Tudorache, C.\* , Slabbekoorn, H\*., Robbers, Y.#, Hin, E.\* , Meijer, J.H.#, Spaik, H.P.\* , Schaaf, M.J.M.\*

\*Institute of Biology, Leiden University, Leiden, The Netherlands

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Many processes in our body are controlled by the biological clock and show diurnal rhythmicity. It is generally accepted that a robust diurnal rhythm is a prerequisite for optimal functioning, whereas a lack of rhythmicity is an indication for disease and aging. In the present study we have investigated the variation in diurnal rhythmicity in a wild type zebrafish population. Our data show a large individual variation on the level of gene expression, hormone regulation and locomotor activity, ranging from robust diurnal rhythms with large amplitudes and rhythm strength to a complete absence of rhythmicity. These phenotypes correlate with consistent individual variation in coping styles, along a continuum between proactive and reactive extremes. We conclude that proactive individuals with strong diurnal rhythms are more intrinsically organised and that an absence of diurnal rhythmicity is an integral part of a reactive coping style, and not necessarily a pathological condition.

### **Virtual Reality for Freely Moving Animals**

Andrew Straw, University of Freiburg

Due to the physics of having a body, the evolutionary history of animals is one in which movement elicits corresponding feedback in all sensory modalities. In turn, these sensations may, ultimately, influence future movement. I suggest that this closed loop interaction between an animal and its environment has profoundly shaped the evolution of brains and behavior and that obtaining insight into how neural circuits shape nature behavior, therefore requires consideration of this issue. Furthermore, collective behaviors are defined by the interactions of multiple individuals, each capable of influencing, and being influenced by, the others. In this talk, I will discuss a new experimental apparatus capable of generating visual virtual reality for freely moving animals. This FreemoVR system repurposes computer games technology to immerse animals into reactive, 3D worlds under precise computer control while retaining unperturbed vestibular and other self-motion sensations and is also capable of creating simulated creatures to interact with real ones. Together with colleagues, we have shown this system works well in flies, fish and mice. I will briefly discuss how in my lab we are using this technology together with *Drosophila* genetics to measure the quantitative effect of blocking individual neuron types on specific visuo-motor behaviors.

### **Understanding the neurogenetics of spoken language: from vocal learning bats to humans**

Sonja Vernes

Sonja C Vernes, Neurogenetics of Vocal Communication Group, Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands

Vocal production learning (herein [vocal learning](#)) - the ability to modify vocal signals based on auditory feedback - is an essential component of human spoken language. The complexity of this task suggests that multiple neurobiological and genetic mechanisms are likely to underlie its evolution and biological encoding. Given the necessary limitations of studying vocal learning in humans, animal models represent an opportunity to understand this spoken language-relevant trait. Bats are highly social animals that have developed sophisticated vocal systems for navigation and communication, and the capacity for vocal learning. I will present work investigating vocal learning in bats, including the use of emerging technologies at genetic, neurobiological and behavioural levels. I will discuss how, by comparing such findings across diverse species, we can identify the shared biological mechanisms underlying vocal learning, which may ultimately shed light on the evolution of human language.



**Can you hear me? Location-dependent call propagation in long-finned pilot whales (*Globicephala melas*)**

Annebelle Kok

Annebelle Kok (Universiteit Leiden), Lisette van Kolfsooten (Universiteit Leiden), James Campbell (Universiteit Leiden), Hans Slabbekoorn (Universiteit Leiden), Fleur Visser (Universiteit Leiden, Kelp Marine Research)

Deep-diving toothed whales live in long-term stable social groups but forage individually at great depths. Therefore, foraging creates spatial segregation, that must be resolved when individuals return to the surface. Given the excellent propagation properties of sound in water, it is likely that calls will be used for relocation between individuals that have lost visual contact. However, who calls to whom? Are calls produced at depth detectable at the surface? And which acoustic parameters could facilitate detection? We collected data from three closely associated pairs of pilot whales, using Suction-cup tags to record their soundscape and dive profile. Next, we combined our tag data on call detectability with propagation modelling of the calls, an unprecedented method. The results provide insight into a communicative challenge in toothed whales that has often been discussed, rarely been tested, and that may be changing due to rising levels of anthropogenic noise in the ocean.

**Interplay between call site characteristics and male body size determines the efficacy of sexual signalling**

Judith Smit

Judith Smit, VU University Amsterdam/Utrecht University  
Wouter Halfwerk, VU University Amsterdam

Advertisement signals can convey information about a male's characteristics, such as body size. The reliability of signals, however, is limited by environmental conditions. Call site characteristics for example have been found to affect call production in a size-dependent way. To investigate whether the interplay between male body size and call site characteristics also affects receivers, we conducted playback experiments with male and female túngara frogs. Females generally preferred large over small males, but small males calling in low water levels had a relatively higher success at attracting a mate than when calling in high water levels. The responses of male receivers followed the same pattern. By selecting call sites with low water levels, smaller males might enhance the relative efficacy of their signals. This means that signalling site selection could function as an alternative mating tactic. To what extent this occurs in nature is yet to be explored.

**Savings of vocal motor skills**

Michiel Vellema

Michiel Vellema - Department of Biology, University of Southern Denmark, Odense, Denmark

Mariana Rocha - Department of Behavioural Neurobiology, Max Planck Institute for Ornithology, Seewiesen, Germany

Sabrina Bascones - Institut Hospital del Mar d'Investigacions Mèdiques (IMIM), Barcelona, Spain

Sándor Zsebők - Department of Systematic Zoology and Ecology, Eötvös Loránd University, Budapest, Hungary

Jes Dreier - Department of Biochemistry and Molecular Biology, University of Southern Denmark

Annemie Van der Linden - Bio Imaging Lab, University of Antwerp, Belgium

Jonathan Brewer - Department of Biochemistry and Molecular Biology, University of Southern Denmark

Manfred Gahr - Department of Behavioural Neurobiology, Max Planck Institute for Ornithology, Seewiesen, Germany

Complex motor skills, such as human speech and birdsong, take considerable time and practice to learn. Without continued practice, the level of skill performance quickly degrades, posing a problem for the timely utilization of skilled motor responses. Here we demonstrate that a songbird with prior singing experience can deal with such a challenge by significantly accelerating the re-development of vocal motor performance. We further show that vocal motor development is associated with synaptic re-organization of a forebrain region that drives vocal motor output, a change in connectivity that persists throughout periods without motor practice. These findings suggest

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that time constraints on skill development can be overcome through the long-term memorization of motor skills by permanently re-organizing the underlying synaptic brain circuitry.

### **Chick chosen Communication changes Community Characteristics**

Wouter Halfwerk, VU University Amsterdam

Animal signals should evolve components that allow optimal communication with intended receivers, such as mates and rivals, while avoiding detection by unintended receivers, such as predators and parasites. Optimal communication does however strongly depend on the environment, which can impose limitations on the production, transmission and perception of signal components. The acoustic communication system of frogs provides an ideal opportunity to assess the relative contribution of sexual and natural selection pressures in relation to habitat-dependent conditions. Using a combination of behavioral experiments and comparative analyses I will review how the sexual displays of animals can evolve in relation to different environments, how this is related to their morphology and how this may even shed light on our evolutionary past in a most unexpected way.

### **The role of singing style in birds that have to cope with anthropogenic noise.**

Eira Bermúdez Cuamatzin

Eira Bermudez-Cuamatzin (1,3), Maricela López-Hernández (2), James Campbell (3), Iriana Zuria (1), Hans Slabbekoorn (3).

(1) Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, México.

(2) Facultad de Ciencias, Universidad Nacional Autónoma de México.

(3) Institute of Biology, Leiden University, The Netherlands.

Several studies have found differences in birdsongs between urban and rural populations, i. e. higher-pitch songs in urban areas that avoid masking by low-frequency noise. Experimental evidence furthermore shows in some species immediate song adjustments in response to noise, but others species seem not to adjust at all. We investigated whether noise-dependent song flexibility may relate to singing style in four Mexican species exposed to 3 experimental sound conditions. In contrast to earlier findings for great tits, none of the species adjusted spectral or temporal parameters in response to noise exposure and conspecific playback. We argue that a possible explanation for the lack of noise-dependent flexibility may be that the consistency in song frequency and timing may have signal value, independent of singing style. We now investigate whether song repertoire size or the difference usage of it may explain the spectral song differences between urban and rural population of great tits

### **Differences in gut microbiota composition in laying hens with high and low levels of feather pecking behaviour**

Jerine van der Eijk

J.A.J. van der Eijk<sup>1,2</sup>, T.B. Rodenburg<sup>1,2</sup>, A. Lammers<sup>2</sup>

1. Behavioural Ecology Group, Department of Animal Sciences, Wageningen University & Research, Wageningen, The Netherlands

2. Adaptation Physiology Group, Department of Animal Sciences, Wageningen University & Research, Wageningen, The Netherlands

Feather pecking, i.e. hens pecking and pulling at feathers or tissue of conspecifics, is a serious welfare and economic issue. Excessive damaging behaviours, such as severe feather pecking, are indicative of an animal's inability to cope with environmental stressors. Microbiota can have long-term influences on behaviour, including fear and stress responses. Fearfulness and stress are related to feather pecking and lines divergently selected on feather pecking differ in intestinal microbial metabolites. These findings suggest a link between the gut microbiota and feather pecking. Therefore, we investigated whether lines selected for high (HFP) and low (LFP) feather pecking differ in microbiota composition. We sampled the gut microbiota at 10 and 30

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weeks of age. We found first indications that the HFP and LFP line differ in microbiota composition. Further research is needed to identify whether microbiota composition could have a causal role in the development of feather pecking.

### **Feather pecking chicken differ from victims in the position and connection strength within their social network**

Elske de Haas

"Elske N. de Haas<sup>1,2</sup>, Bram van Mil<sup>3</sup>, Bas Rodenburg<sup>1,2</sup>

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Certain individuals can affect group structure via effects on others. In chickens, feather pecking can cause pain and stress in victims, and could influence their groups' social network (SN). Here, SN measures of peckers and victims were compared (n = 32, groups = 5). Groups of 8 hens were placed in a test-room for 15 min. Undirected individual location data of proximity (less than 25cm) was used for SN analysis and compared between peckers and victims by GLM with correction for pen. Peckers were closer to all other animals in comparison to victims. Number of connections, individual preference and strength of influence of one individual on others in the network was lower for peckers in comparison to victims. Peckers appear to have a distinct position in their social group compared to victims, while victims appear more strongly connected and show preferences or aversion for certain individuals. The data did not reveal that peckers influence the whole network or give information on the

### **Can traffic noise confuse bats?**

Bawan Amin

Bawan Amin - Leiden University

Inga Geipel - Smithsonian Tropical Research Institute

Wouter Halfwerk - VU Amsterdam

Anthropogenic noise affects animals in lots of ways, ranging from physiology to cognition. One aspect that is crucial for survival and is shown to be impaired by anthropogenic noise is foraging behaviour. Noise is generally considered disturbing, but may under certain circumstances provide a source of useful information regarding the environment. The use of noise as source of environmental information however requires that animals can recognize it as such. Rain noise for instance, delays bat emergence from their roosts, most likely because heavy rain is not a favourable condition for foraging. Interestingly, traffic noise and rain noise share spectral characteristics and may thus be confused with each other. Here, we did playback experiments at roosts of a neotropical bat in the rainforests of Panama, to test whether traffic noise induces the same response as rain noise, and thus could possibly lead to confusion. Our data provides new insights into perception of traffic noise. Rebecca Nordquist

### **Rise of a Phoenix. Ethology within academia\***

Saskia S. Arndt

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The Netherlands has a very good international reputation in the study of animal behaviour, not at least thanks to the work of Dutch scientists like Nikolaas Tinbergen and Frans de Waal. Ethology is one of the most important fundamental disciplines and behavioural measures are of high importance for disciplines like veterinary medicine, biology, agriculture and related areas, the neurosciences, and within animal welfare sciences. However, the discipline ethology, disappears from Dutch academic education and thus, new insights in and expertise in assessing and interpreting animal behaviour) are vanishing. Similar developments are reported from other countries. This is inadmissible from a scientific as well as from a societal point of view. This presentation will

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substantiate that new life must be given to scientific and educational ethological approaches and that (international) collaboration within the discipline needs to be stimulated.

\* This abstract will be discussed during the ALV.

### Abstracts of posters

#### **Attracted by song? Female off-territory forays in the great tit (*Parus major*)**

Nina Bircher

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In many socially monogamous species individuals pursue copulations outside the social pair-bond leading to extra-pair offspring (EPO). The behavioural mechanisms leading to EPO are still not well understood. In territorial species both sexes have been shown to leave their territory and these excursions might be used for extra-pair copulations. In songbirds females using song to assess males might specifically prospect males with more elaborate song traits. Here we explore whether female off-territory movements are linked to male traits and extra pair paternity. We combine data from radio-tracking, song recordings, plumage measures and microsatellite genotyping collected in a population of personality typed great tits (*Parus major*). We present results on female prospecting behaviour in relation to male traits and extra-pair paternity providing new insights into the social complexity of territorial systems and the behavioural decisions leading to social connectivity.

#### **Seeing voices - designing video stimuli to test multimodal communication in Zebra finches**

Simon Ralph

Animal Ecology Vrije Universiteit Amsterdam

Ralph Simon<sup>1</sup>, Judith Varkevisser<sup>2</sup>, Qiaoyi Liang<sup>2</sup>, Katharina Riebel<sup>2</sup> and Wouter Halfwerk<sup>1</sup>

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Vocal communication not only involves auditory components but is most often a multimodal combination of audio, visual and even tactile signals. Experimental study of multimodal signals requires stimulus control in all modalities. For the combined audio-visual signalling in birds, standard video equipment is not suited because it is tuned to human visual perception. The visual system of birds differs from that of humans in that they have higher temporal resolution (> 100 frames/s) and are tetrachromatic. For birds, standard videos designed for humans are only a poor representations of birds' sensory experience. We here present the progress we made in, designing video material suited for investigating multimodal communication in birds. Applying colour adjustments and higher monitor refresh and video frame rates allowed us to produce corrected video stimuli and to test their suitability to attract birds.

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### **Male song as a multicomponent signal in the great tit**

Tjomme van Mastrigt

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Male bird song is a classic example of a sexually selected signal. It functions in advertising male qualities, and is subject to female choice. However, a male's song as well as its quality as a mate are defined by multiple components. A female may obtain direct, non-genetic benefits and indirect, genetic benefits from a mate. Different song traits may reflect different aspects of the singer's quality and therefore may benefit females by being considered together. Multicomponent vocal signalling has been studied at the level of male characteristics (such as age and body size), but it is rarely studied in the context of benefits that accrue to a choosing female's fitness. In a cross-fostering study on great tits (*Parus major*), we investigated whether different male song components reflect direct or indirect benefits to a female's fitness. This yields insight into whether great tit song reflects different components of male quality, which may be selected via mate choice.

### **The effect of sleep deprivation on (song) learning in songbirds as a model for speech acquisition in human infants**

Alexandra Dwulit

Experimental Psychology, Utrecht University

A. Dwulit, G.J.L. Beckers, J.J. Bolhuis, S.M. ter Haar

Sleep has been suggested to be important for learning and memory in humans and other mammals. Indications for effects of sleep on learning have been revealed by neurobehavioral studies, but no causality is shown. Songbirds have been commonly used as models for vocal learning. We aim to study if there is a causal relation between sleep and song learning by performing a sleep deprivation experiment in songbirds. Since this is novel research, the first step is to set up a sleep deprivation method in adult birds. Here we present an ongoing project on a novel sleep deprivation method in songbirds. The effectiveness of the method will be measured using a spatial cognitive task and by measuring several behavioral outputs before and after sleep deprivation. We expect that short-term sleep deprivation leads to reduced cognitive performance, changes in post-sleep song structure, and reduced behavioral activity, while controlling for stress and input.

Zijlmans Dian Animal Ecology Utrecht University

### **The effect of pack separation on social relationships and behaviour in captive African wild dogs (*Lycaon pictus*)**

D.G.M. Zijlmans and M.J.H.M. Duchateau

African wild dogs (*Lycaon pictus*) are endangered carnivores with a population size that is currently estimated at 6.600 adults in the wild. The European Endangered Species Program (EEP) for African wild dogs aims to maintain a healthy zoo population and thereby prevent extinction of the species. Safaripark Beekse Bergen participates in the African wild dog EEP with a large breeding pack, but the composition of this pack became unnatural and unstable by the death of the alpha-male. Nine male littermates were transferred to GaiaZOO to prevent inbreeding and restore the complex social structure. This study evaluates this captive management decision by comparing the social relationships and behaviour in both zoos before and after pack separation. Based on the results, recommendations are provided for further improving zoo animal management and the welfare of captive African wild dogs.

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### **Tracing the origins of language: syntax in common marmosets?**

Meike Katharina Zemihn  
Institute of Biology, Leiden University

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(3) Linguistics and Philosophy, Massachusetts Institute of Technology, USA

One feature considered uniquely human is complex syntax, rules governing the combination of call elements. Unlike apes and most other primates, common marmosets (*Callithrix jacchus*) share their cooperative breeding system with humans. This socioecological factor has been suggested as a driver of vocal complexity. We examined the complexity of call combinations and their contexts in free-living common marmosets. Preliminary analyses of one call combination suggested that calls could potentially be combined using compositional syntax. Whereas tsik calls were directed at a predator or human observer and egg calls were given during foraging and play, the combination of tsik+egg was given during intraspecific competition as well as directed at an unknown animal (rabbit). The contexts of tsik and egg calls thus seemed related to fear or excitement, respectively, while the contexts of the combination seemed intermediate. Further analyses will show if this holds true for a bigger sample size.

### **Laboratory raised zebra finches avoid high-way noise recordings**

Liu Quanxiao, Animal science and health, Institute of Biology, Leiden University

Quanxiao Liu, Hans Slabbekoorn and Katharina Riebel  
Behavioural Biology, Institute of Biology, Leiden University, Leiden, The Netherlands

Anthropogenic noise is pervasive and invasive. More than 70 million population in EEA countries are exposed to high-level noises that could induce discomfort. Animals, especially vocal species like songbirds, are also affected by noise. Noise stresses them, masks their communication and even has demographic consequences. The evidence strongly indicates songbirds may find noise aversive. But this is yet a question that we haven't asked the birds directly: if given a quiet and exact counterpart, would they avoid noisy environment? To ask the birds, I simultaneously recorded high-ways and nearby woodlands as pairs for 24 hours. By using these paired clips, I exposed adult zebra finches in a system that has two connecting chambers under three treatments 1) high-way noise VS no playback, 2) woodland noise VS no playback 3) high-way noise VS woodland noise. Through a comparison of total time spent in each chamber during different treatments, I would test if birds avoid high-way noise or not

### **The effect of microhabitat acoustics on signal evolution in frogs**

Hugo Loning, Animal Ecology, Vrije Universiteit Amsterdam

Wouter Halfwerk, Vrije Universiteit Amsterdam

Species have evolved a wide variety of signals to attract mates, yet the evolutionary mechanisms driving this variation remain often unclear. Correlations between signal design and signalling site properties have been found for many species, indicating that the physical environment may contribute to shaping this signal variation. Signalling sites can influence signal evolution by affecting the production or transmission of a signal. In this study, I have investigated the relation between call design and microhabitat in several frog species by recording calls and conducting transmission experiments at calling sites. To allow for between-species comparisons, I broadcasted the same recording at all calling sites, which included calls of all species and artificial tones. I expect to find a

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difference in transmission properties of calling sites between frog species and that frog calls perform best in calling habitat of their own species.

### **From Behaviour to Genes: Perceptual Effects of FoxP1**

Heim Fabian, Behavioural Biology, Leiden University

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Forkhead box proteins (FoxPs) are implicated in vocal communication in humans. Parallels have been discovered in phenotypes associated with dysfunctions of neuronally expressed FoxPs in different species. FoxPs are highly expressed in brains of juvenile and adult songbirds such as the zebra finch. FoxP expression has been observed not only in areas involved in song learning and production, but also in brain regions associated with song perception. However, only male zebra finches sing a song, whereas females do not sing. Expression patterns of FoxPs across sexes and vocalisation types suggest broader roles for these transcription factors in other aspects, such as auditory perception. To test the role of FoxPs for auditory perception in female zebra finches, we induced a FoxP1 knockdown in the nucleus HVC. Knockdown animals were screened for behavioural differences during preference and Go/NoGo tests. Subsequently, changes in transcriptional activity were investigated by RNA sequencing.

### **Measuring animal welfare will never become easy.**

Jeroen van Rooijen

Will we ever be able to demonstrate sentience? This question was raised in the introduction to a recent symposium (Wickens et al., 2017). Forty years ago it was claimed that in the future it would be possible, by more refined experiments, to prove the existence of animal feelings (Griffin, 1978). Till today no such experiments have been performed. This claim was rejected by Van Rooijen (1981). Within the Naturwissenschaften it is principally impossible to prove the existence of animal feelings. The founders of ethology (behaviour biology) had good reasons to exclude feelings from ethology (Van Rooijen, 1983). Feelings are more vague than behaviour. The use of feelings as causations could damage the study of causation (Van Rooijen, 1985; Kennedy, 1992). Research within the Naturwissenschaften is able to make the idea that feelings exist more convincing (Van Rooijen, 1981, 1997). However, the principle of parsimony remains important (Van Rooijen, 2015).