



ABSTRACT BOOK

7th European Student
Conference on
Behaviour & Cognition

NOVEMBER 6-7, 2021

Hungary



Edited by:

Zsófia Bognár, Huba Eleőd,
Rita Lenkei, Boglárka Morvai,
Paula Perez Fraga, Vivien Reicher

Department of Ethology, Institute of Biology,
Eötvös Loránd University, Budapest, Hungary

Table of contents



Live talk session 1

Melina Kienitz - A different view: how bumblebees differentiate sucrose solutions from water visually	6
Pia Marlena Böhm - Consortship stability of female homosexual consortships in Japanese macaques (<i>Macaca fuscata</i>)	7
Masahiro Daimon - Naïve males have mate preference for the first mating partner in medaka fish	8
Svenja Capitain - Influence of reward and location on dogs' behaviour towards an interactive artificial agent	9

Pecha Kucha session 1

Tímea Kovács - Training style affects dogs' behaviour, learning performance and sleep	10
Katinka Tóth - Imitation sensitivity in family dogs (<i>Canis familiaris</i>)	11
Edina Vanderer - The mask-wearing of the experimenter negatively influences family dogs' behavior in standard cognitive tests	12

Elevator speech session 1

Kata Vékony - Someone worth fighting for - the association between social dynamics and dog-owner relationship in multi-dog households	13
Mariana Hess - How the owner's attachment to your dog is associated with the owner's degree of stress, anxiety, and depression	14
Viktória Bakos - Factors behind separation-related behavior in dogs: first empirical evidence about the effect of fear and frustration	15
Zsuzsanna Berkesné Gedai - Do dogs remember a specific human after a short interaction or only their behaviour?	16
Beatrix Laczi - Can dogs become jealous of robots?	17

Live talk session 2

Valeria Ferrario - Testing calculated reciprocity in tufted capuchin monkey (<i>Sapajus</i> spp.)	18
Elisa Fernández Fueyo - Why do some primate mothers carry their infant's corpse? A cross-species comparative study	19
Plotine Jardat - How does pet-directed speech affect horses?	20
Ariane Veit - Domestic pigs learn through observation of conspecifics, humans and ghosts	21

Table of contents



Pecha Kucha session 2

- Kimberly Brosche** - Team play versus solo success: Comparing domestic pigs' performance in a cooperative and a non-cooperative task **22**
- Marietta Amann** - Do ponies develop a preference for a helpful or an unhelpful human? **23**
- William O'Hearn** - Responses to a group member's novel foraging capability in the tolerant multi-level society of Guinea baboons **24**

Elevator speech session 2

- Ellen Soeters** - Water availability impacts habitat use in chacma baboons (*Papio ursinus*): implications for early hominin behaviour **25**
- Valentine Comin** - Let's play: Social object play in Common Ravens **26**
- Livia Langner** - The influence of voice identity and linguistic content on dogs' (*Canis familiaris*) ability to follow human voice direction **27**
- Huba Eleőd** - What do dogs hear? - Evoked brain responses to human and conspecific emotional vocalizations in dogs **28**
- Vivien Reicher** - Sleep-dependent memory consolidation in dogs with ADHD-like behaviour **29**

Live talk session 3

- Malavika Madhavan** - Territorial males adjust their song according to intruder song complexity **30**
- Lorenzo Micolucci** - The importance of social feedback in social recognition in *Gallus gallus* **31**
- Lucille Dumontier** - Effects of the early-life and adult environment on laying hens' spatial cognition **32**
- Rachel Degrande** - If not here, then there : The domestic hen is capable of inference by exclusion in a food searching task **33**

Pecha Kucha session 3

- Lisa Schanz** - Something new, upside down and on my back – Presence of cattle does not affect measures of fearfulness in broiler chickens **34**
- Elisa Perinot** - Quantifying formation flight and energy expenditure in free-flying birds **35**
- Parul Bhatnagar** - Breeding biology of Rufous-bellied Woodpecker (*Dendrocopos hyperythrus*) in Kedarnath Wildlife Sanctuary (Western Himalayas), Uttarakhand, India **36**

Table of contents



Elevator speech session 3

Maria Samuela Pasculli - Three-day-old chicks spontaneously associate spatial and luminance information	37
Tusheema Dutta - Seasonal variation in escape behaviour of Indian birds along a rural-urban gradient	38
Swastika Dey - Ecology and the behaviour of the mudskippers in the intertidal zones of Sundarbans, Bakkhali	39
Trisa Bhattacharjee - Human perception for Conservation	40
Aanchal Panchal - Role of Termites in Maintaining Weed-free Fungal Gardens	41
Erhan Ertuc - Another Open Window to Unknown Areas of Memory: Olfactory Effect	42

Live talk session 4

Paula Mut-Arbona - P2X7R Receptors modulate schizophrenic-like behaviour in a maternal immune activation model in mice	43
Mathilde Delacoux - The Impact of Stress and Personality on Learning	44
Mélissa Peignier - Exploring links between personality and environmental traits in wild poison frogs	45
Danita Daniel - Personality predicts Behavioural Lateralization in a Population of Wild Zebrafish	46

Pecha Kucha session 4

Abhishek Singh - Rationality of Shoaling Group Size Choices in Zebrafish (<i>Danio rerio</i>)	47
Babita Choudhary - What does a <i>Nasonia</i> female want?	48
Agnese Crisante - Public perception of reptile welfare and cognition	49

Elevator speech session 4

Paula Perez Fraga - Who is a curious pig? Individual variation in family pigs' response to novelty	50
Tsighie Venturini - Domestic cat personality dimensions assessed by an online survey of Italian cat-owners	51
Guilherme Henrique Lima Marques Silva - Personality and brain laterality in common marmosets (<i>Callithrix jacchus</i>)	52
Zhaoying Chen - Magnitude effect and spatial numerical bias in middle identification: evidence from rhesus monkeys (<i>Macaca mulatta</i>)	53
Cecília Carreiro - Multisensory stimulation for the treatment of hydrocephalus behavioral sequelae in a geriatric canine patient	54

Table of contents



Live talk session 5

Carolín Niederbremer - Counting on Numbers – Numerical Abilities in Sharks and Stingrays	55
Alexandros Vezyrakis - Into the reptilian Umwelt: The effect of chemical versus visual information on the learning performance of lizards	56
Rachel Probert - Individual stability but low population diversity of whistles from Indian Ocean bottlenose dolphins (<i>Tursiops aduncus</i>)	57

Pecha Kucha session 5

Francesca Terranova - Signature whistles of the bottlenose dolphins inhabiting the Ligurian sea	58
Bruna Paula - Maned wolf simultaneous vocalization	59
Kia Radovanovic - Effects of Age, Training, and Number of Dogs in the Household on Inequity Aversion in Dogs	60



Live talk session 1

A different view: how bumblebees differentiate sucrose solutions from water visually

Melina Kienitz, Massimo De Agrò, Tomer J. Czaczkes

Animal Comparative Economics laboratory, Department of Zoology and Evolutionary Biology,
University of Regensburg, Germany

Bees are major model organisms for studying pollination processes, ecology, and cognition. Training and testing paradigms often use drops of sucrose placed on artificial flowers as a reward. However, the fact that sucrose reflects UV is ignored. Given their ability to perceive UV, we wondered if bees could differentiate between sucrose solutions and water visually. To test this, we presented bumblebees (*Bombus terrestris*) a drop of 1.6M sucrose solution next to a drop of water either in the presence or absence of UV light. The initial choice on each visit was recorded, and whether or not the bee hovered in front of the drops, and thus had an opportunity to inspect both. 71% of bees who inspected both drops chose the sucrose drop. Due to increased viscosity, drops of sucrose could be recognized by their shape, not only their colour. We thus also carried out a second experiment by placing the drops inside centrifuge tubes filled with cotton. This removed the structural differences of the drops. 66% of choices were for the sucrose-containing centrifuge tube in the presence of UV light. A control condition to exclude the use of other cues (chemical) is currently underway. However, regardless of the mechanism, it seems that bees can indeed distinguish sucrose solution and water visually. This has large implications for all studies using bees foraging on sucrose and may force us to re-examine much of the literature on bee cognition and learning.



Live talk session 1

Consortship stability of female homosexual consortships in Japanese macaques (*Macaca fuscata*)

Pia Marlena Böhm (1,2); Lena Sophie Pflüger (1,2); Katharina Pink (3);
Michael A. Huffman (2,4); Bernard Wallner (1,2)

(1) Department of Behavioral & Cognitive Biology, University of Vienna, Austria;

(2) Austrian Research Center for Primatology, Ossiach, Austria;

(3) Department of Evolutionary Anthropology, Faculty of Life Sciences, University of Vienna, Austria;

(4) Primate Research Institute, Kyoto University, Inuyama, Aichi, Japan

Research on homosexual consorts in female Japanese macaques (*Macaca fuscata*) has expanded our knowledge of the nature of homosexuality. In same-sex consorts both females gain sexual reward through mounting and genital stimulation. Accordingly, female-female consorts are defined by elements of sexual behavior. The duration and intensity of consort behaviors can vary and some females change their same-sex partners within hours, while others stay together for days or reunite more than once. The present study aimed at factors responsible for differences in pair bond stability in female-female pairs. We focused on behaviors already described to strengthen pair bonds in other primates. We hypothesized that the intensity and reciprocity of affiliative behaviors and sexual stimulation affect consort duration and reoccurrence. A semi-free population of Japanese macaques (Affenberg Landskron, Austria) was observed for one mating season. Both homo- and heterosexual consorts were quantified and about 40h of focal data on same-sex consort behaviors were analysed. Of all sexually mature females, 46% engaged in homosexual interactions. The pairs showed differences in their consort durations - some met only once, others engaged repeatedly. The amount of body contact (huddling) a pair shared increased their consort duration and their chance of reuniting, while the frequency of mounting had no effect. The present findings underline the complexity of sexual relationships in non-human primates.



Live talk session 1

Naïve males have mate preference for the first mating partner in medaka fish

Masahiro Daimon (1), Satoshi Ansai (1), Hirotaka Sakamoto (2), Takafumi Katsumura (2), Hideaki Takeuchi (1)

(1) Tohoku University; (2) Okayama University; (3) Kitasato University

Females prefer to mate with familiar males, while males court promiscuously, irrespective of familiarity in medaka fish. Here we showed that, when a naïve male, reared in male groups, was paired with a female, several mating experiences significantly decreased the latency to mate. In contrast, the mating experiences with partner-swapping did not decrease the latency to mate, suggesting that the naïve male could recognize the first mating partner and have mate preference for it. In the case of using experienced males, multiple mating with the same partner did not influence the latency to mate. Thus, the behavioral maturation according to the multiple mating experiences could erase the male mate preference. Furthermore, we identified 10 highly and differentially expressed genes after the mating experience in the brains with pituitaries of the naïve males, and three of them are required for a functional cascade of the thyroid hormone system. Now we are examining the possible involvement of thyroid hormone in the behavioral maturation triggered by the first mating experience.



Live talk session 1

Influence of reward and location on dogs' behaviour towards an interactive artificial agent

Svenja Capitain (1), Judit Abdai (2), Ádám Miklósi (2,3)

(1) Department of Physics, Chemistry and Biology, Linköping University, Linköping, Sweden;

(2) MTA-ELTE Comparative Ethology Research Group, Budapest, Hungary;

(3) Department of Ethology, Eötvös Loránd University, Budapest, Hungary

When studying the complexity of social interactions in non-human animals, robots have outstanding potential to improve precision and understand underlying principles. Dogs engage in various social interactions with artificial agents (UMOs), but dog-robot interaction is in its infancy. Here we investigated the effect of reward and location on dogs' behaviour toward an interactive UMO and their choice when a second UMO is introduced. We expected that dogs interact with the UMO even without reward and display preference to a helpful UMO, but they rely on simpler associations (location of the UMO) than the partner itself. The UMO either helped dogs to retrieve food (Food group) or an object dogs had to fetch for their owner (Fetch group), from an unreachable location (10 trials). The UMO either used the same starting position across trials or changed it constantly (familiarization). In the test phase, the same unsolvable task was repeated, now with a second, unhelpful UMO in the room. During familiarization, dogs in the Fetch group showed more gaze alternations between the UMO and cage than the Food group but chose this UMO less often later. The UMO changing positions during familiarization was also significantly associated with choosing the familiar UMO in the test phase. We propose that an adequate level of motivation and complexity of task, as well as variability in the position of the UMO are essential in familiarizing dogs with an artificial agent as an interactive partner.



Pecha Kucha session 1

Training style affects dogs' behaviour, learning performance and sleep

Tímea Kovács (1), Vivien Reicher (2,3), Barbara Csibra (2), Márta Gácsi (2,3)

(1) Department of Sociobiology/Anthropology, University of Göttingen, Göttingen, Germany;

(2) Department of Ethology, Institute of Biology, Eötvös Loránd University, Budapest, Hungary;

(3) MTA-ELTE Comparative Ethology Research Group, Budapest, Hungary

The family dog is a promising model in neurocognitive research due to its adaptation to the human environment. Considering that emotional treatment influences learning and sleep in both humans and dogs, our study aimed to investigate the effects of supportive and controlling training styles on dogs' 1) behaviour during training, 2) learning performance and 3) sleep parameters. After an adaptation session, dogs (N=24) were trained by an experimenter to perform known actions for newly learnt commands on two occasions: supportive vs. controlling conditions were conducted in a balanced within subject design. Both trainings were followed by a test and a 2-hour-long non-invasive sleep EEG measurement. After sleep, dogs' performance was retested. Behaviour was affected by a condition×order interaction; dogs, whose controlling training was on the second occasion, spent more time near the owner in the controlling condition. Condition did not affect test and retest performance but order did; dogs performed better on the first occasion. Improvement in learning success (=retest-test) was only present when the second occasion was a supportive condition. Sleep efficiency was higher, while NREM latency was lower after controlling training. Emotional treatment (condition) affected both behaviour and memory consolidation, and the violation of expectation regarding the training style (different condition on the second occasion) also seemed to play an important role in dogs' stress responses.



Pecha Kucha session 1

Imitation sensitivity in family dogs (*Canis familiaris*)

Katinka Tóth

Budapest University of Technology and Economics, ELKH Research Centre for Natural Sciences

It is known that imitation in the imitated half can result in affiliative emotions and increased social interactions. Imitation sensitivity requires the subject to notice that their own actions match those of the imitator. This type of sensitivity has so far been convincingly demonstrated only in humans and in primates. In our research, we tested family dogs (N=28) in an imitation situation, based on the elements of the Do as I Do (DAID) training method. First, the dogs observed and mimicked one of two possible actions presented by the owner. Then they observed that one of the two experimenters presented the action performed by the subject and the alternative action. The dogs' behavior was observed in an orientation situation, during which the experimenters moved building blocks from one side of the lab to the other. During the behavioral coding, we recorded whether the experimenter, who imitated correctly or incorrectly, was preferred by the dogs (regarding viewing behavior and proximity). Subjects were divided into three groups: naive in terms of DAID training (N=9), preparing for a DAID exam (N=7), and a certified DAID practitioner (N=12). We hypothesize that dogs with the DAID Basic exam are more sensitive to imitation, and since they are more aware of the imitation situation, they will show greater preference, and the group that does not receive DAID training at all will have the weakest preference for the correctly imitating experimenter.



Pecha Kucha session 1

The mask-wearing of the experimenter negatively influences family dogs' behavior in standard cognitive tests

Edina Vanderer & Anna Kis

Research Centre for Natural Sciences, Budapest, Hungary

One of the most spectacular changes in everyday life due to COVID is the mandatory wearing of masks, which was proven to negatively influence social interactions and communication among people. The different COVID protocols, however, not only affected humans, but also had a huge impact on companion animals, such as dogs, living in human society. The current study tested N=20 family dogs with an experimenter wearing or not wearing a face mask (randomized within subject design). Previously validated, standard test situations were used (responsiveness to human pointing, basic obedience, spontaneous play, emotion recognition, threatening approach), assuming that some would be less impacted by the mask-wearing experimenter than others. We found that the mask-wearing of the experimenter influenced dogs' performance both in variables that traditionally indicate cognitive abilities (such as the number of correct answers) as well as in stress- and disturbance signs (such as drinking, side preference). Additionally, the effect of the mask (in some cases) was modulated by the dogs' baseline performance, as mask usage caused less trouble for dogs who generally performed better. In sum, the behavior of the participating family dogs was greatly modified by wearing a mask. This outcome has important implications for the entire field of dog cognition research, as COVID protocols during quarantines made mask usage mandatory for owners and experimenters in many establishments around the world.



Elevator speech session 1

Someone worth fighting for - the association between social dynamics and dog-owner relationship in multi-dog households

Kata Vékony & Péter Pongrácz

Eötvös Loránd University, Department of Ethology

In groups of social animals hierarchy helps to minimize conflicts around limited resources. Companion dogs usually do not need to compete for traditional resources, but they still form well-defined hierarchies. We hypothesize that for companion dogs the most important resource is the owner. In this questionnaire study we wanted to find whether certain aspects of the dog-owner relationship would be associated with their dogs' rank. Owners (N=615) of at least two dogs completed the questionnaire for 1040 dogs. Based on a set of questions about rank-related behaviors, we calculated a 'dominance score' for each dog in each household. From the questions about dog-owner relationship, PCA revealed five factors: Disobedience, Food-related problems, Inconsistent owner, Irritability and Owner dependence. We used GLMM to find association between these factors and the dominance score of dogs. We found a non-significant positive trend between Owner dependence and the dominance score ($p = 0.062$). Dominance score had a positive association with Irritability ($p < 0.001$) and the age of the dog ($p = 0.01$). Our results show that certain aspects of the dog-owner relationship have an association with the social dynamics between the dogs in the household. The trend with Owner dependence supports the concept of the owner being the most important resource for family dogs, but further research is needed in this direction.



Elevator speech session 1

How the owner's attachment to your dog is associated with the owner's degree of stress, anxiety, and depression

Mariana Hess & Carine Savalli

Institute of Health and Society - Federal University of São Paulo - Baixada Santista, SP, Brazil

Anxiety, depression and stress are current health problems, Brazil is the Latin country with the highest rate of anxiety and depression. Science has shown that living with a dog can help its owner cope with stress, anxiety and depression. The aim was to investigate the association between the degree of attachment of the owner to the dog with the degree of anxiety, depression and stress of the owner, and how characteristics of the tutor, the dog and of its relationship can influence these associations. Data collected online, degree of attachment measured by the Lexington Attachment to Pet Scale and degree of stress, anxiety and depression measured by the Depression, Anxiety and Stress Scale and were classified as Mild-Normal or Moderate-Severe. 200 valid answers, owners with a mean age of 27.99 years (SD=10.96), 85.5% women. We found that the higher the degree of attachment, the higher the degree of stress, anxiety and depression of the tutor ($p < 0.05$). We observed that the degree of attachment was higher for participants with Moderate-Severe depression and stress than for Normal-Mild stress ($p < 0.05$). As for anxiety, we found that, only for women, the degree of attachment was higher among those with moderate or severe anxiety ($p < 0.0001$). We can hypothesize that the strong attachment bond with the dog can be used as a coping resource for such conditions, but causality cannot be inferred. The owner's personality and attachment style may play a role and need to be better investigated.



Elevator speech session 1

Factors behind separation-related behavior in dogs: first empirical evidence about the effect of fear and frustration

Bakos Viktória, Lenkei Rita, Faragó Tamás, Pongrácz Péter

Eötvös Loránd University, Department of Ethology

Companion dogs experience stress in their owner's absence. This is a normal reaction to some extent, however, severe cases can cause behavioral problems. Due to the diverse manifestation of separation-related behavioral problems, we can assume that different symptoms indicate different inner states of the dog. With a combination of questionnaire-based assessments and short separation tests, recently we established a model assuming that fearful dogs behave differently during separation than dogs that are more prone to frustration. However, the empirical evidence was still missing that dogs with different separation-related symptoms would react differently in other situations, which likely elicit frustration or fear. We tested companion dogs (N=45) in an indoor separation test and in four additional behavior tests. Subjects (N=23) were either assigned to the frustration tolerance tests or to the fearfulness tests (N=22). From each type, one test was connected to an object and one to a human. We used PCA for the assessment of dogs' behavior both in the separation and the behavior tests. According to the results, depending on their behavior in the frustration or fear-eliciting tests, dogs behaved differently from each other also in the separation test. These are the first results that experimentally verify the possible motivational background of dogs' reaction to separation, which may be a relevant factor in the treatment or even the prevention of this behavioral problem.



Elevator speech session 1

Do dogs remember a specific human after a short interaction or only their behaviour?

Zsuzsanna Gedai (1), Beatrix Laczi (1), Judit Abdai (2), Ádám Miklósi (1,2)

(1) Department of Ethology, Eötvös Loránd University, Budapest, Hungary;

(2) MTA-ELTE Comparative Ethology Research Group, Budapest, Hungary

Dogs (*Canis familiaris*) display similar social behaviours toward unfamiliar self-propelled objects (UMOs) as toward humans, in various interactions. In a previous study, dogs remembered the UMO's behaviour even after a month following a short social interaction, but they did not display preference toward the familiar UMO over unfamiliar ones even after one day or a week. However, it is not clear whether dogs did not recognize the familiar UMO or the method was inappropriate to study individual recognition (IR). Here we investigated whether dogs can recognize a human partner after a week, applying the same method as used with UMOs. We expected that dogs recognise the familiar human and previous failure regarding the IR of UMOs was specific to the UMO partner. In the test, the human partner helped dogs to obtain an unreachable ball and then played with it. After one week, we tested whether dogs display specific behaviour toward the familiar human over an unfamiliar one. Dogs were also re-tested in the same helping and playing interaction as before to test whether they remember the partner's behaviour in general. Analysis of dogs' behaviour is in progress. We assess whether dogs display preference toward the familiar human by approaching this partner first. We also measure the latency of looking at the partner during the problem solving task to see whether they learn about the helpful behaviour of the partner and remember her behaviour after one week.



Elevator speech session 1

Can dogs become jealous of robots?

Beatrix Laczi (1), Fábio Faustino Agostinho (2), Judit Abdai (3), Ádám Miklósi (1,3)

(1) Department of Ethology, Eötvös Loránd University, Budapest, Hungary;

(2) University of Évora, Évora, Portugal;

(3) MTA-ELTE Comparative Ethology Research Group, Budapest, Hungary

Dogs engage in various social interactions with artificial self-propelled objects (UMO) but it is unclear whether dogs recognize the UMO as 'true' social partner. Jealous behavior emerges when an important social relationship is threatened by a third-party individual. The behavior appears only when the potential rival is a social agent (e.g. dog) but it does not occur in case of non-social objects (e.g. magazine). Here we investigated whether a UMO can elicit jealous behavior in dogs and whether the UMO's level of sociality influences this behavior. We hypothesized that dogs display jealous behavior when their owner attends to the UMO, but only if it displayed social or animate behavior before. First, dogs observed the behavior of the UMO which either displayed inanimate motion, animate and goal-directed motion or engaged in an interaction with a human (between-subject design). Following this, the owner engaged in an interaction with the other dog from the household, the UMO observed before, and read from a magazine while ignoring the subject dog (three trials; all subjects encountered all potential rivals). We assessed owner-, rival- and interaction-related behaviors (e.g. looking at or touching the owner, rival or interaction) and activity (e.g. moving and sitting) displayed by dogs in the presence of different rivals. We also measured the frequency of dogs' attempt to interrupt the interaction between the owner and rival. The analyses of our data is currently in progress.



Live talk session 2

Testing calculated reciprocity in tufted capuchin monkey (*Sapajus* spp.)

Valeria Ferrario (1,2), Elsa Addressi (1), Gabriele Schino (1)

(1) Istituto di Scienze e Tecnologie della Cognizione, Consiglio Nazionale delle Ricerche;

(2) Dipartimento di Scienze della Vita e Biologia dei Sistemi, Università di Torino

The reciprocal exchanges of services or goods have been extensively studied in nonhuman primates, but their proximate mechanisms are still unclear. One of the proposed mechanisms is known as 'calculated reciprocity'. Animals engaging in calculated reciprocity are supposed to be motivated to behave cooperatively by the expectation of a future return benefit. Thus, calculated reciprocity requires advanced cognitive abilities such as the capacity to plan social interactions or some form of 'future thinking'. We tested the ability of capuchin monkeys to rely on calculated reciprocity when sharing food with a group mate. Monkeys were tested in pairs in three different experimental conditions in which the partner had the possibility to reciprocate (Reciprocity), the partner did not have this possibility (Control), or the subject was rewarded by the experimenter for sharing its food (Pseudoreciprocity). If capuchin monkeys engaged in calculated reciprocity, we expected subjects to share more food in the Reciprocity condition than in other conditions. Our results showed no differences in the amount of food transferred to the partner in the three experimental conditions. However, in the Pseudoreciprocity condition capuchin monkeys increased the amount of food shared along successive test sessions. These results suggest the expectation of reciprocation did not motivate capuchin monkeys to share their food, although they were able to learn that sharing can lead to a reward.



Live talk session 2

Why do some primate mothers carry their infant's corpse? A cross-species comparative study

Elisa Fernández-Fueyo (1,2), Yukimaru Sugiyama (3), Takeshi Matsui (4)
and Alecia J. Carter (2)

(1) Department of Biological Sciences, Royal Holloway, University of London;

(2) Department of Anthropology, University College of London;

(3) Primate Research Institute, Kyoto University;

(4) Takasakyama Natural Zoo

Non-human primates respond to the death of a conspecific in diverse ways, some of which may present phylogenetic continuity with human thanatological responses. Of these responses, infant corpse carrying by mothers (ICC) is the most frequently reported. Despite its prevalence, quantitative analyses of this behaviour are scarce and inconclusive. We compiled a database of 409 published cases across 50 different primate species of mothers' responses to their infants' deaths and used Bayesian phylogenetic regressions with an information-theoretic approach to test hypotheses proposed to explain between- and within-species variation in ICC. We found that ICC was more likely when the infant's death was non-traumatic (e.g. illness) versus traumatic (e.g. infanticide), and when the mother was younger. These results support the death detection hypothesis, which proposes that ICC occurs when there are fewer contextual or sensory cues indicating death. Such an interpretation suggests that primates are able to attain an awareness of death. In addition, when carried, infant age affected ICC duration, with longer ICC observed for younger infants. This result suggests that ICC is a by-product of strong selection on maternal behaviour. The findings are discussed in the context of the evolution of emotion, and implications for evolutionary thanatology are proposed.



Live talk session 2

How does pet-directed speech affect horses?

Plotine Jardat (1), Ludovic Calandreau (1), Vitor Ferreira (1), Chloé Gouyet (1),
Céline Parias (1), Fabrice Reigner (2), Léa Lansade (1)

(1) CNRS, IFCE, INRAE, University of Tours, PRC, 37380 Nouzilly, France;

(2) UEPAO, F-37380, Nouzilly, France

Studying the human-animal relationship allows to better understand how our behaviour can influence the one of animals. For example, it has been revealed that horses have exceptional sociocognitive skills toward humans. They perceive our emotions and they can detect our intentions. Recently, we showed that horses also respond to a kind of speech used to talk to companion animals, called pet-directed speech (PDS). Indeed, horses reacted more positively when an experimenter talked to them in PDS compared to adult-directed speech (ADS). Nevertheless, the mechanism underlying this response is still unexplored. In this study, we showed horses videos of humans using these two types of speech in order to determine whether PDS draws horses' attention and arouses them, or if it helps to place them in a more positive emotional state. Horses had different reactions to the videos of PDS and ADS, with higher attention and a greater increase in heart rate during PDS. However, their emotional expressions did not reveal a more positive state during PDS than ADS. We conclude that PDS improves horses' attention toward humans and arouses them, so that this type of speech can be used by horsemen and horsewomen. Moreover, these results confirm that video projections can be used to study horses' perception of humans. Key words: *Equus caballus*, behavior, cognition, motherese, infant-directed speech, dog-directed speech, arousal, emotional valence, human-animal relationship



Live talk session 2

Domestic pigs learn through observation of conspecifics, humans and ghosts

Ariane Veit, Stefanie Weißhaupt, Arnaud Bruat, Marianne Wondrak,
Ludwig Huber

University of Veterinary Medicine Vienna, Messerli Research Institute, Comparative Cognition Unit

Based on previous research, domestic pigs seem to be able to learn through observation of their conspecifics. However, little is known about their learning mechanisms, that so far include enhancement effects and object movement re-enactment. While the former indicates social learning through the demonstrator's actions, the latter suggests some form of emulative learning in which the observer instead learns through object movements. We therefore investigated if domestic pigs learn through the demonstrator's actions or the object's movements by providing 36 free-ranging domestic pigs with one of four different demonstrations on how to solve a two-step manipulative foraging task. While observers of conspecific or human demonstrators could learn through body movements, observers of two ghost control demonstrations (social or non-social) could only learn through the self-moving objects. Analysis of subsequent tests revealed that while a control group that did not receive demonstrations prior to testing interacted more with the apparatus, the observers of the four demonstrations were proportionately more successful and solved the task faster. No significant differences with regard to success could be found between the different observer groups. Neither imitation, nor enhancement or social facilitation can explain those results. We therefore conclude that pigs possess the ability to learn through emulative processes, by either observing conspecifics, humans or ghost demonstrations.



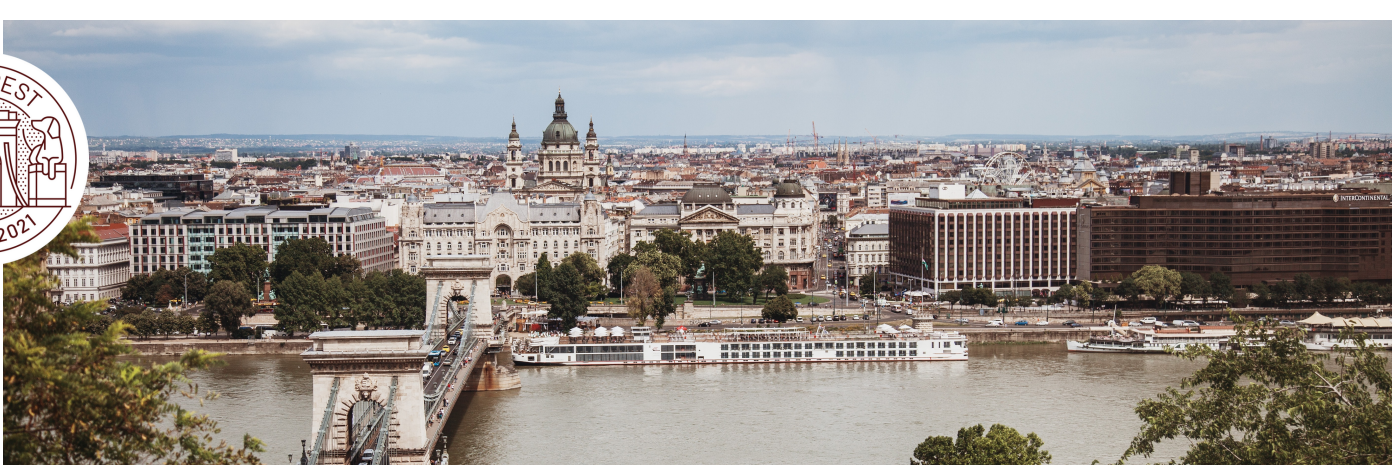
Pecha Kucha session 2

Team play versus solo success: Comparing domestic pigs' performance in a cooperative and a non-cooperative task

Kimberly Brosche, Jim McGetrick, Jean-Loup Rault

Institute of Animal Welfare Science, Department for Farm Animals and Veterinary Public Health,
University of Veterinary Medicine, Vienna, Austria

An animal's environment is full of challenges that cannot be overcome by one individual on its own. Activities like group hunting, cooperative breeding or social play all require the participants to cooperate. By coordinating their actions, animals can reach a commonly pursued goal and, as a consequence, yield mutual benefits that make cooperation evolutionarily favorable. Despite its sometimes high cognitive demands, numerous species have been shown to cooperate. Among these, farm animals are especially worth studying, not only to gain insights into their behavior and cognition, but potentially also to assess and enhance their welfare. To investigate differences in domestic pigs' performance in a cooperative compared to a non-cooperative, individually solvable task, 36 piglets were trained on two separate "log-lift" apparatuses. One contained a single, continuous log which one pig was unable to lift without a partner, whereas the non-cooperative version allowed subjects to lift two shorter logs independently. In both cases, successful completion of the task was rewarded with food. We observed considerable inter-individual variation in learning time and success rates as well as some differences in success between the two tasks, although proficient pigs always mastered both. Finally, we discuss how contrasting the two tasks could not only help to study pig welfare, but also to draw inferences on the cognitive mechanisms underlying cooperation.



Pecha Kucha session 2

Do ponies develop a preference for a helpful or an unhelpful human?

Marietta Amann (1), Jim McGetrick (1,2), Jessika-Maximiliane V. Cavalleri (3),
Friederike Range (1)

(1) Domestication Lab, Department of Interdisciplinary Life Sciences, Konrad Lorenz Institute of Ethology,
University of Veterinary Medicine Vienna, Ernstbrunn, Austria;

(2) Department for Farm Animals and Veterinary Public Health, Institute of Animal Welfare Science, University of
Veterinary Medicine Vienna, Austria;

(3) Equine Internal Medicine, University Equine Hospital, University of Veterinary Medicine Vienna, Vienna, Austria

Some animals have been shown to discriminate between cooperative and uncooperative humans through direct or indirect experience. It was shown that ponies discriminate between humans that they first saw in a video either bothering or grooming a pony. In this study, we investigated whether ponies also discriminate between humans based on direct experience. A helpful human fed a pony with carrots and an unhelpful person presented carrots to the pony but ate them herself. 12 ponies and 48 humans participated in the study. Each pony was tested in a test and a control condition and interacted 5 times with each human. The ponies could then choose between the humans in a preference test in 12 trials. We also analysed the ponies' heart rate and heart rate variability. The ponies did not develop a preference ($P = 0.8441$) for either human and showed no difference in heart rate and heart rate variability (HR: $P = 0.647$, SDNN: $P = 0.7856$, RMSSD: $P = 0.3906$, %VLF: $P = 0.8813$, %LF: $P = 0.5889$, %HF: $P = 0.06026$) between the humans. It could be that ponies would have learned to discriminate had they more experience with the humans. Yet, retaining a carrot was likely not aversive enough for the ponies to perceive the person as unhelpful and to act differently toward the two humans. It could still be that discriminating between a helpful and an unhelpful human might not be relevant for ponies as they do not usually have the option to choose between humans as cooperation partners.



Pecha Kucha session 2

Responses to a group member's novel foraging capability in the tolerant multi-level society of Guinea baboons

William O'Hearn

Cognitive Ethology Laboratory, German Primate Center, 37077 Göttingen, Germany

Successfully navigating a social environment means making adaptive partner choices, which is facilitated by the ability to evaluate the social ties, traits, or capabilities of other group members. Much is known about non-human primates' knowledge of third-party kin, dominance, and social relationships. However, less understood is how individuals evaluate others' capabilities. Our project investigates whether Guinea baboons recognise the foraging capability of group members, and whether knowledge of conspecifics' capabilities affect their choice of social partners. In our study, piloted in captivity and destined for a wild population, we artificially increase the foraging capability of one group member using an apparatus only the chosen individual – the specialist – can operate. We measure the specialist's social interactions before, during, and after the period of apparatus presentations to determine if other group members alter their treatment of the specialist in response to their novel foraging capability. In this talk I will discuss the preliminary findings from our pilot study with a captive population of Guinea baboons at Nuremburg Zoo and our plans to expand the project to the wild. Our study breaks new ground by testing assessment of foraging capability in a socially tolerant multi-level society that is minimally structured by kinship or dominance rank, leading to a social environment wherein partner choice may be less constrained than in other primate societies.



Elevator speech session 2

Water availability impacts habitat use in chacma baboons (*Papio ursinus*): implications for early hominin behaviour

Ellen Soeters (1), Elise Huchard (2), Guy Cowlshaw (3), Alecia J. Carter (1)

(1) Department of Anthropology, University College London;

(2) Université de Montpellier;

(3) Institute of Zoology, Zoological Society of London

Water availability, particularly groundwater, in arid areas such as East Africa (past and present) has been relatively overlooked, despite being associated with early hominin sites. It has been hypothesised that groundwater sources (e.g. springs) acted as hydro-refugia for early hominins. We used two troops of chacma baboons (*Papio ursinus*) in the arid Tsaobis, Namibia, as an analogue to explore this hypothesis. We did this by investigating how aridity and changes in water availability impacted their habitat use, specifically ranging patterns (home range size and daily travel distance) and the number of intertroop interactions. We found that water availability was a significant predictor for habitat use for baboons at Tsaobis. Specifically, home range sizes and daily travel distances increased with more available water sources, whilst aridity and a lack of water sources led to an increase in the number of intertroop interactions. Measures of aridity (temperature and Normalised Difference Vegetation Index) did not significantly impact ranging patterns. Our findings confirm the ability of baboons to adapt their ranging patterns in accordance with local groundwater and suggest that early hominins may have followed the same strategies. Future studies should aim to focus on water availability and habitat use across taxa. This is particularly important for conservation given the implications of future climate change on fluctuating water availability in arid environments.



Elevator speech session 2

Let's play: Social object play in Common Ravens

Valentine N. Comin (1), Palmyre H. Boucherie (2), Thomas Bugnyar (2)

(1) Department of General Psychology, University of Padua, Padova, Italy;

(2) Department of Cognitive Biology, University of Vienna, Vienna, Austria

Multiple mammalian and avian species spend a non-negligible amount of time and energy playing, either alone or with another individual. However, reasons why one might choose to interact with a playmate rather than playing alone have seldom been investigated. We studied this in ravens (*Corvus corax*), a long-term monogamous corvid species, renowned for their problem-solving abilities, advanced socio-cognitive skills, sociality, and playful attitudes. They are also one of the few avian species to present all three forms of play: locomotor, object, and social play. Here, we investigated the factors influencing ravens' propensity to play alone or with another individual. Twice a day for three weeks, 21 captive ravens, from five families (parents and offspring), were given two wooden boards with objects. One of the boards ("familiar") was similar in every trial while the objects on the second ("novel") changed every day. We investigated the time ravens spent playing together vs. alone, and in a second time, how social play was affected by the age of the partners, their sex, and the type of board (familiar or novel). We here present out preliminary results.



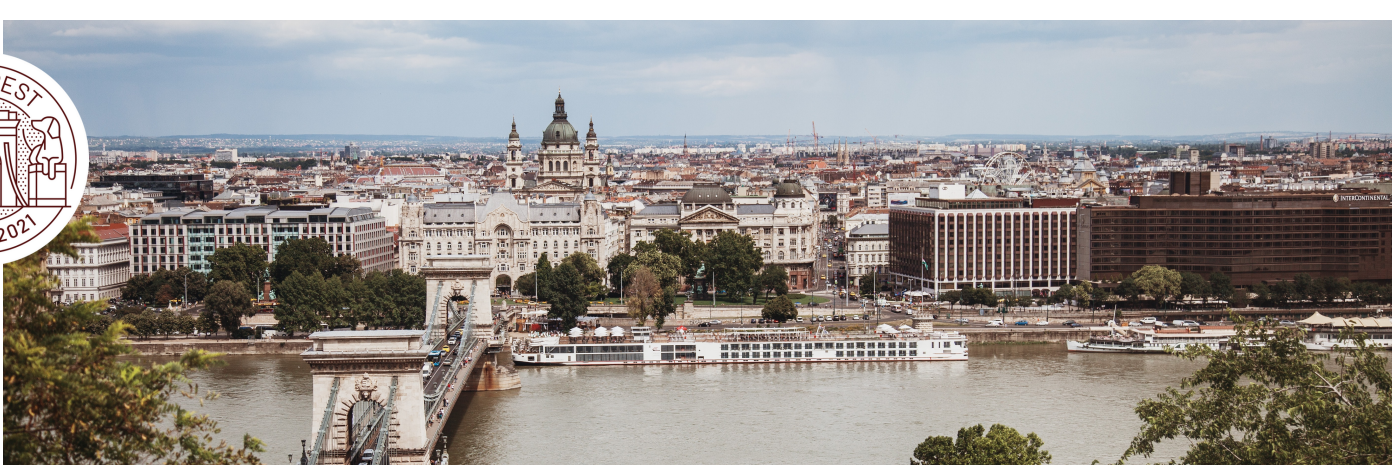
Elevator speech session 2

The influence of voice identity and linguistic content on dogs' (*Canis familiaris*) ability to follow human voice direction

Livia Langner (1), Sabina Žakelj (1,2), Henrietta Bolló (1),
József Topál (1), Anna Kis (1)

(1) Research Centre for Natural Sciences, Budapest, Hungary; (2) University of Ljubljana, Slovenia

Domestic dogs are well-known for their abilities to utilize human referential cues for problem solving, including following the direction of human voice. Furthermore, dogs' brain shows differential reactions to lexical and intonational cues of human speech, indicating a form of auditory processing similar to humans. The present study investigated whether dogs' voice following performance is influenced by (1) the content and intonation of the given instruction, and (2) the specific person talking to the dog (owner versus experimenter). In the present study, dogs (N = 37) and their owners participated in two-way object choice conditions. Dog were presented with three referential auditory cue conditions, where the (I) 'identity of human informant' (owner vs. unfamiliar experimenter), the (II) communicative function of attention getter (ostensive addressing vs. non-ostensive cueing) and the (III) 'tone and content of the auditory cue' were systematically changed. Dogs also participated in a 'standard' pointing condition in which a visual cue to the specific target was provided. Significant differences were observed between conditions regarding the number of correct choices and response latencies, indicating that dogs' response to auditory communicative signals are influenced by the content and intonation of the message as well as by the source of the information.



Elevator speech session 2

What do dogs hear? - Evoked brain responses to human and conspecific emotional vocalizations in dogs

Anna Bálint (1,2), Huba Eleőd (1), Lilla Magyar (3,4), Anna Kis (5),
Márta Gácsi (1,2)

(1) MTA-ELTE Comparative Ethology Research Group, Budapest, Hungary;

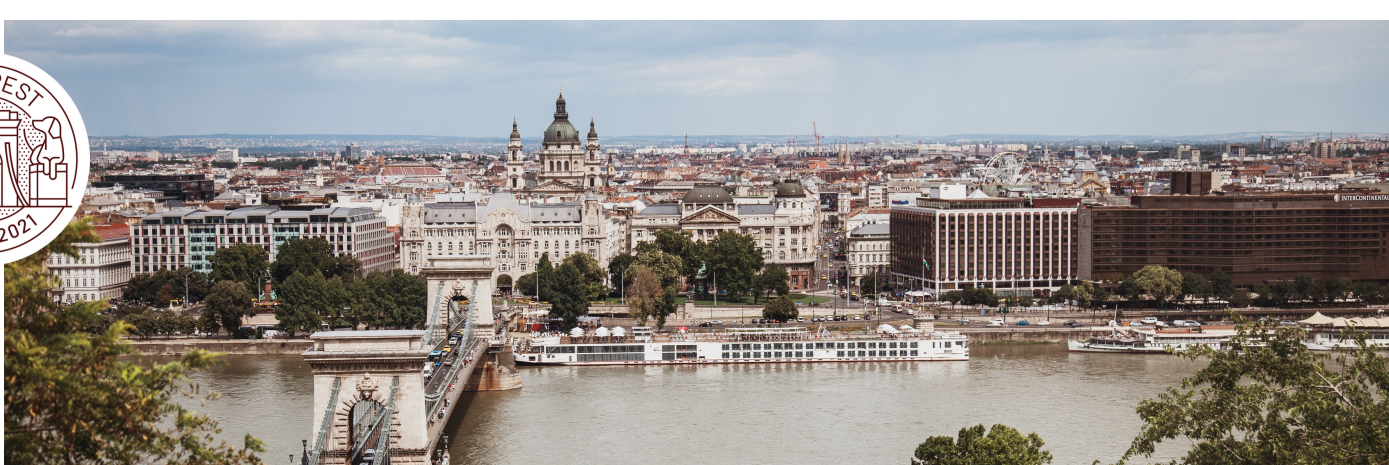
(2) Department of Ethology, ELTE Eötvös Loránd University, Budapest, Hungary;

(3) Department of Social Studies, University of Stavanger, Stavanger, Norway;

(4) MTA-ELTE "Lendület" Neuroethology of Communication Research Group, Hungarian Academy of Sciences, ELTE Eötvös Loránd University, Budapest, Hungary;

(5) Institute of Cognitive Neuroscience and Psychology, Research Centre for Natural Sciences, Budapest, Hungary

Recent advances in the field of canine neuro-cognition allow for the non-invasive research of brain mechanisms in family dogs. Considering the striking similarities between dog's and human (infant)'s socio-cognition at the behavioural level, both similarities and differences in neural background can be of particular relevance. The current study investigates brain responses of N=17 family dogs to human and conspecific emotional vocalizations using a fully non-invasive ERP paradigm. We found that similarly to humans, dogs show a differential ERP response depending on the species of the caller demonstrated by a more positive ERP response to human vocalizations compared to dog vocalizations in a time-window between 250-650 ms after stimulus onset. A later time-window between 800-900 ms also revealed a valence sensitive ERP response in interaction with the species of the caller. Our results are the first ERP evidence to show the species sensitivity of vocal neural processing in dogs along with indications of valence sensitive processes in later post-stimulus time-periods.



Elevator speech session 2

Sleep-dependent memory consolidation in dogs with ADHD-like behaviour

Vivien Reicher (1,2), Barbara Csibra (1), Márta Gácsi (1,2)

(1) Institute of Biology, Eötvös Loránd University, Department of Ethology, Budapest, Hungary;

(2) MTA-ELTE Comparative Ethology Research Group, Budapest, Hungary

The family dog is increasingly recognized as a model for human neuropsychiatric conditions, including attention-deficit/hyperactivity disorder (ADHD). In addition to ADHD-like behavior in dogs, they show notable phenotypic and genotypic variability. These characteristics provide an excellent starting point for studying the innate and environmental components of ADHD traits as well as the underlying neural processes. In dogs, similarly to humans, sleep promotes memory consolidation. However, we do not know whether sleep-dependent memory consolidation is impaired in ADHD-like dogs, as in the case of children with ADHD. To examine the learning performance and sleep-related memory consolidation in dogs (N=20), a reversal learning paradigm was applied. Dogs had to learn in which one of the two pots (placed on the right and left side, divided by a wall) has a treat. Upon successful learning, the reward values were reversed and dogs had to choose the previously incorrect side (reversal shift). The learning task was followed by a one-hour-long non-invasive polysomnographic afternoon sleep. Then dogs were retested with the same task. We hypothesized that dogs with higher owner-rated ADHD scores will perform worse in the reversal shift phase, i.e., they will be less able to inhibit the previously learned response. Further, we hypothesized that dogs with lower ADHD scores will sleep more and perform better in the retest. Our preliminary results will be presented at the conference.



Live talk session 3

Territorial males adjust their song according to intruder song complexity

Malavika Madhavan

University of South Bohemia in České Budějovice

Song is important in bird communication and has key functions in mate attraction and territorial defense by males against intruding rivals. Song complexity is an important attribute of song and greater song complexity has been linked to males with higher fitness who have been consequently preferred by females in some species. In this study, we simulated an intruding male via a song playback experiment and investigated the response of Lined Seedeater (*Sporophila lineola*) territorial males to intruders with less or more song complexity than them. Total number of syllables and syllable diversity were chosen as song complexity variables. We also investigated whether less or more complex playback influenced secondary physical response variables of the focal male. The results showed that territorial males gave significantly stronger vocal responses to more complex songs i.e. they increased their own song complexity, than to less complex song. No other response variables (number of flights, closest distance to speaker, etc.) were related to playback treatment, although the number of flights was significantly related to male tarsus length.



Live talk session 3

The importance of social feedback in social recognition in *Gallus gallus*

Lorenzo Micolucci, Maria Loconsole, Lucia Regolin

University of Padua, Department of General Psychology

A large body of literature shows that young domestic chicken could discriminate between familiar and non-familiar conspecifics, preferring the familiar individual. Our study aims at understanding whether social feedback plays a role in determining such a preference in chicks' social choice. Pairs of female chicks (*Gallus gallus*) were reared together from the day of hatching to day 4 of life in rectangular metal cages, separated by a one-way mirror. The one-way mirror allowed one chick (the one that will eventually undergo testing) to see its cage companion, while the other subject could only see its own reflection. This resulted the first chick seeing its companion, but without receiving any social feedbacks (e.g., simultaneous feeding, eye-contact, etc.). On day 2 and day 4 of life, chicks were tested in a 6-minute free-choice task. Each subject was placed in a triangular arena and could freely move towards the chick it was reared with (familiar) or another unknown chick from the same batch, age, and sex (unfamiliar). Contrary to previous evidence, chicks tested on day 2 failed in discriminating between the two conspecifics and approached both at chance level. Interestingly, on day 4 a preference for the unfamiliar subject emerged. These results will be discussed highlighting the distinctly refined social and decisional mechanisms in *Gallus gallus*, as to avoid social isolation chicks preferentially approach an unknown individual rather than a familiar, but unresponsive one.



Live talk session 3

Effects of the early-life and adult environment on laying hens' spatial cognition

Lucille Dumontier (1), Andrew Janczak (2), Janicke Nordgreen (1)

(1) Norwegian University of Life Sciences, Faculty of Veterinary Medicine, Department of Paraclinical Sciences, Ås, Norway;

(2) Norwegian University of Life Sciences, Faculty of Veterinary Medicine, Department of Production Animal Clinical Science, Ås, Norway

Laying hens' rearing and laying environments often differ in their degree of complexity, which can affect individuals' characteristics and welfare. We investigated the effects of the complexity of the rearing and adult environment on spatial cognition. To do so, we tested White Leghorn hens in a detour task. These hens were cage- or aviary- reared, and then housed in standard or enriched cages during the laying period (4 groups, n=16 per group). The degree of complexity of the adult environment was higher in enriched cages than in standard cages, with dustbathing platforms and curtains provided. Each hen was tested twice (62 & 64 weeks) and latencies to perform the detour was recorded (cutoff of 10 minutes). The analyses showed a significant difference between hens reared in cages and housed in standard cages compared to hens reared in aviaries and housed in enriched cages at both ages (62w: $p=0.028$; 64w: $p=0.032$). For each rearing condition, hens housed in enriched cages during lay tended to perform better than those housed in standard furnished cages. Thus, the complexity of the rearing environment has long-lasting effects on spatial cognition and the ability to solve a detour task. Rearing hens in cages leads to individuals with poorer spatial skills, probably due to the lack of complexity. However, the adult environment can partly compensate for this if it offers a higher degree of complexity than the rearing environment.



Live talk session 3

If not here, then there: The domestic hen is capable of inference by exclusion in a food searching task

Rachel Degrande, Plotine Jardat, Fabien Cornilleau, Léa Lansade,
Ludovic Calandreau

CNRS, IFCE, INRAE, Université de Tours, PRC, F-37380, Nouzilly, France

Despite the strong link between farm animals' welfare and their cognition (ANSES 2018), there is still a gap in our understanding of the range of their cognitive abilities. The process of inferring by exclusion is a complex cognitive capacity, which has been demonstrated in few birds categorized as "intelligent birds" (corvids, parrots). The principle is that when presented with two objects A and B (here two tubes), the individual can see that the reward is not inside A and therefore infers the reward is inside B. We tested this capacity in the domestic hen. With twelve hens trained, our results show that when hens can freely explore the two tubes (free-choice test), they have a significant tendency to walk towards the tube they can see inside, even if it does not contain the reward. But when individuals are tested in conditions in which they can visit only one of the two tubes (forced-choice test), two thirds of the hens learned to reason by exclusion (significantly within 36 to 63 trials). Data suggest that motor laterality may be linked to success in inference trials. To our knowledge, this result is a first demonstration that the domestic hen is capable to infer by exclusion. Moreover, the study suggests that the hens' selective use of exclusion reasoning might be driven by a threshold from which the risk to fail is worth the cognitive cost of the mental process. Keywords: inference by exclusion, reasoning, cognitive capacities, domestic hen



Pecha Kucha session 3

Something new, upside down and on my back – Presence of cattle does not affect measures of fearfulness in broiler chickens

Lisa Schanz & Christoph Winckler

University of Natural Resources and Life Sciences, Vienna, Department of Sustainable Agricultural Systems

Keeping broiler chickens on pasture with cattle may increase range use of the chickens and reduce predation by predatory birds. Previous studies suggest that increased range use is associated with less fearfulness, as for example measured by a tonic immobility (TI) test, an inversion test or a novel object test. During three years, four batches of broilers (110-120 broilers each) were TI tested at four weeks of age and then allocated to control (single species broiler group on pasture) and treatment (pasture with ten cattle) balanced for seconds in TI. The last batch of broilers was additionally tested for their reaction to three novel objects and a random sample (41 broilers) was tested for their initial reaction to a simulated predator (held upside-down/inverted by feet for a maximum of 30s) before and after pasture. After six weeks on pastures all broilers were TI tested again. Descriptive statistics revealed: There was no difference between broilers ranging with cattle and broilers ranging only with conspecifics for duration in TI (treatment (mean \pm sd): 129s \pm 142s, control: 127s \pm 136s) or in the reaction to a novel object. The intensity (wingbeats/s) in the inversion test was lower for both groups after pasture, but the delta between before and after pasture was greater for broilers with only conspecifics (1.6 \pm 1.9) compared to broilers with cattle (0.8 \pm 1.8). Fearfulness in broilers appeared in our study not to be affected by the presence of cattle on pasture.



Pecha Kucha session 3

Quantifying formation flight and energy expenditure in free-flying birds

Elisa Perinot (1,2), Johannes Fritz (1,3), Leonida Fusani (2,3),
Marco S. Nobile (4), Bernhard Voelkl (1,5)

(1) Waldrapteam Conservation & Research, Austria; (2) University of Veterinary Medicine Vienna;
(3) University of Vienna; (4) Eindhoven University of Technology; (5) University of Bern

For a long time, flock dynamics have sparked interest among scientists. One of those is formation flight, a strategy that medium- and large-sized birds adopt to save energy when facing long journeys. However, little is known on formation flight mainly due to the difficulty in collecting data. During a human-guided autumn migration of northern bald ibises (*Geronticus eremita*), all the birds of a flock were geared with high-precision GNSS loggers, which collected raw satellite signals from several satellite constellations. After post-processing the data allowed to calculate birds' position with cm-level accuracy and to extract lots of information about formation flight and in-wake flying. Loggers also collected accelerometer data, from which it is possible to extrapolate VeDBA, a proxy for energy expenditure. We created a model based on fuzzy logic to classify and extract bouts of in-wake and not in-wake flying, to test our hypothesis that in-wake flying is less energetically demanding. According to our results, when flying behind another bird in the same horizontal plane birds tend to stay in a defined volume, which remains consistent over the migration. On average, birds fly outside of this volume roughly 10% of the time. However, this volume only partially overlaps with the one that we classify as in-wake flying, raising interesting questions on formation flight. Indeed, when flying in the wake of another bird, the VeDBA tended to be lower compared to not in-wake flying.



Pecha Kucha session 3

Breeding biology of Rufous-bellied Woodpecker (*Dendrocopos hyperythrus*) in Kedarnath Wildlife Sanctuary (Western Himalayas), Uttarakhand, India

Parul Bhatnagar, Dinesh Bhatt, Amar Singh

Gurukul Kangri University (DU), Haridwar, Uttarakhand

In the Indian subcontinent there is almost no scientific study about the breeding biology of Rufous-bellied woodpecker (RBW). Keeping this fact in view an attempt was made to understand the breeding biology of RBW from March 2018 to July 2020 in Kedarnath Wildlife Sanctuary (Western Himalayas), Uttarakhand. Results indicated that the breeding season of RBW extends from March to July. RBW is a primary cavity nester in which male woodpecker builds the nest on selected tree species such as Buransh (*Rhododendron arboreum*), Utis (*Alnus nepalensis*), Kharsu (*Quercus semecarpifolia*), Akhrot (*Juglans regia*), and Moru (*Quercus floribunda*). The most preferred tree species to build cavity nest by the study species was Buransh (N =5). Twelve active nests were located on tree trunks and branches. One egg was laid & clutch size ranged from 2 to 3 with an average of 2.72 ± 0.12 eggs and the incubation period ranged between 16 to 18 days (16.72 ± 0.20 days). The average provisioning period was 25.81 ± 0.36 days (Range 24 – 28 days). The Hatching success was 77.42 %.The average depth of the nest was found 29.5 ± 6.67 cm (Range 22 to 45 cm) and diameter of the cavity opening was 7.09 ± 0.07 cm (Range 7.0 to 7.2 cm). Nests (N=12) were made at the height between 7 and 28 feet above ground (average 19.08 ± 6.08 feet). All the nesting sites were found between 1700-2579 m (ASL). Nests were excavated in all the directions except for North and northeast, 50% nests were either East or South-East facing.



Elevator speech session 3

Three-day-old chicks spontaneously associate spatial and luminance information

Maria Samuela Pasculli, M. Loconsole, L. Regolin

University of Padua, Department of General Psychology

Crossmodal correspondences (CC) are spontaneous associations of non-redundant information across different sensory domains. There is evidence of such a phenomenon in humans (including preverbal infants) and other adult mammals, suggesting its shared origin in this clade. Here we investigate a case of visual-spatial CC (i.e., space-luminance association) in a precocial bird species (i.e., the domestic chicken) aiming to provide a first evidence from a non-mammalian species and to clarify the ontogenesis of this association. Chicks already showed capable of spontaneous multimodal integration, thus making an optimal model for the study of precocial abilities. 3-day-old chicks ($n=40$) were presented with two (one in the left and one in the right hemispace of an arena) identical panels, either dyed black (low luminance) or white (high luminance). Chicks could circumnavigate either panel to obtain a food reward. Akin to humans, they preferentially chose the left side when presented with black panels and the right side when presented with white panels. Additionally, a control group ($n=39$) tested with two grey panels showed no spatial preference. Our results show a specific pattern of CC already reported in adult humans, supporting the idea of CC not being a prerogative of mammals. Moreover, as we showed CC in very young animals (3-days-old) they are likely a spontaneous, experience-independent and early-available mechanism.



Elevator speech session 3

Seasonal variation in escape behaviour of Indian birds along a rural-urban gradient

Tusheema Dutta & Bivas Nag

IISER TVM (India); Ludwig Maximilian University of Munich (Germany)

Cities act as ecological traps for all animals, and urbanization is one of the key contributors of the world's current ecological catastrophe. Contrary to rural populations, Urban creatures face lower predation but the energy expense of escape behaviors are equal for both. So urban fauna are predicted to show higher tolerance towards human disturbances. Multiple investigations have shown that urban bird populations have a shorter flight initiation distance than rural populations. From March 2020 to April 2021, we analyzed the behavioral plasticity in escape behavior of avifauna (30 species) in 120 paired urban and rural populations for a distance of 2300 km in India. We found that there was profound seasonal variation in the escape behaviors in the two groups where urban birds escaped the quickest during monsoon and least during summer and for rural birds the seasons showing maximum and least alertness were during spring and winter respectively. With an increase in altitude an increase in alert distance was seen. When hunting is minimal, the trends revealed indicated that avifauna prioritize lowering active surveillance expenses. Breaking flight parameters into subcomponents, we argue, might offer extra and supplementary insight on the root factors of such behaviors which will enable us to anticipate ecological traps and manage wildlife accordingly.



Elevator speech session 3

Ecology and the behaviour of the mudskippers in the intertidal zones of Sundarbans, Bakkhali

Swastika Dey.

Behaviour, Ecology and Evolution Lab, West Bengal State University

Mudskippers, show the unique characteristic of surviving on both land and water. These quirky individuals are well known for their unique behaviour and adaptation outside water. They are the true bony fishes (Osteichthes) belonging to order Gobiiformes, family Oxudercidae and subfamily Oxudercinae. Three species two genera were reported in the study site namely *Periophthalmus novemradiatus*, *Periophthalmus septemradiatus*, and *Boleophthalmus boddarti*. Their relative abundances, distribution and preferred microhabitats of different inhabiting species were identified using sampling methods of quadrat, transects etc. *P. novemradiatus* were found at all intertidal levels and distributed all over the study area. But being the same genus, *P. septemradiatus* were exclusively found on the high to middle tidal mudflats with shady areas. *B. boddarti*, the largest of all, was found most of the time feeding on the liquidy low tidal mudflats. Graphical representation of Behaviour repertoire and time budget were done employing focal animal sampling, instantaneous scanning methods with extensive ad libitum study on field. Being the most small and active ones, *P. novemradiatus* showed courtship and burrow making behaviours. Though the mudskippers are listed as LEAST CONCERNED in the IUCN Red Data List, with rapid degradation of their sole habitat and mangroves, this study would help to draw a comparative analysis on changes in their abundances and behaviour, if threatened in the near future.



Elevator speech session 3

Human perception for Conservation

Trisa Bhattacharjee

Pondicherry University, Department Of Ecology and Environmental Sciences

With an increasing urbanization and population, humanity is making its way into wild for her survival. But this is affecting the natives of the wild and their living. There are few major dynamic characters of the human civilization including history of land use, community conservation interaction, ethnographies, psychology of traumatic events and cultural history (Pooley et.al., 2020) that are needed to be studied, understood, assessed and reviewed along with action plans that are accepted by stake holders (Madden 2004) in order to get a better understanding of the human wildlife interaction. For the conservation of carnivores and large mammals multiuse landscapes are quite helpful, but they also pose a threat to human life in the areas of overlap (Kshetry et.al., 2017). In some places human wildlife interactions may lead to human-human conflict between people sharing different goals, culture, attitude, feeling and wealth (Madden 2004). By fulfilling the ecological needs of the wildlife, socio-economic needs of the local communities and reducing the losses caused by shared spaces one may fulfil the conservation goals (Kshetry et.al., 2020). Thus, knowing the areas specific perseverance's is very important in order to make any wildlife study successful (Dickman 2010).



Elevator speech session 3

Role of Termites in Maintaining Weed-free Fungal Gardens

Aanchal Panchal & Rhitoban Ray Choudhury

Indian Institute of Science Education and Research, Mohali

Among higher termites, a subfamily Macrotermitinae includes insect farmers which developed agriculture some 30-40 Ma. They are in an obligate mutualism with a Basidiomycete fungus of the genus *Termitomyces* and this relationship is known to have an African origin. Termites cultivate *Termitomyces* on a substrate (fungus comb) inside the mound. A regular maintenance of fungus combs is done by the termites through the continuous addition of digested plant matter and soil alongwith faeces. This fungal cultivar serves as a food source for the termites and in turn *Termitomyces* gets a suitable substrate for its growth. As most of the agricultural systems are prone to attack by pests and weeds, similarly this insect farmer-crop association also needs to deal with the invasion of weedy fungus such as *Pseudoxylaria*. This invasive fungus competes with *Termitomyces* for growth on the substrate provided by the termites. Normally the growth of *Pseudoxylaria* is suppressed inside the nest by the termites. But in the absence of termites, the fungal gardens are taken over by *Pseudoxylaria*. The stability of this symbiotic association depends on the proper growth of *Termitomyces* and therefore it is essential for termites to quickly detect and inhibit the growth of weeds inside their fungal gardens. In our study, we are trying to investigate the behavioural responses shown by the termites to maintain a monoculture of *Termitomyces* by suppressing the growth of *Pseudoxylaria* inside their fungal gardens.



Elevator speech session 3

Another Open Window to Unknown Areas of Memory: Olfactory Effect

Erhan Ertuc & Canan Cakmak

Ankara University Faculty of Veterinary Medicine

The increasing number of studies on cognition has also increased the number of studies in some cognitive processes. One of these cognitive process is memory. It is known that the memory is one of the most complicated cognitive process which helps people to store and retrieve information. Some animals also have short-term and certain specialized memory types including associative and episodic memory. It can be said that there are many factors affect these memory types and memory retrieval. To date, we know that not very much research has been done for investigating the role of senses on memory retrieval. However, according to studies we can claim that olfactory effects on memory retrieval are really robust. Moreover, we know that doing olfactory-based exercises for dogs significantly affects the welfare and emotional status in a good way. Yet, little is known about the link between olfaction and memory retrieval in dogs although there are plenty of research investigated in humans. The aim of this study is to review the current literature about the relationship between memory and olfactory signals. Since there are few studies which address this issue, another aim is to discuss about the future directions of the relationship of memory retrieval and olfaction.



Live talk session 4

P2X7R Receptors modulate schizophrenic-like behaviour in a maternal immune activation model in mice

Paula Mut-Arbona (1,2) & Beáta Sperlágh (1,2)

(1) Laboratory of Molecular Pharmacology, Institute of Experimental Medicine, Hungarian Academy of Sciences (IEM HAS), H-1450 Budapest, Hungary;

(2) János Szentágotthai Doctoral School, Semmelweis University, Budapest Hungary

Introduction: Schizophrenia (SCZ) is regarded as a neurodevelopmental psychiatric disorder, where an insult at the prenatal stage may prime the nervous system to develop in a compromised way resulting in behavioral alterations in individuals. P2X7 receptor (P2X7R) draw considerable attention due to its involvement in diseases of the central nervous system, suggesting a specific role of P2X7 under pathological conditions related to memory and cognition. Our objective was to determine the role of the receptor in the SCZ-like behaviors. Methods: The maternal immune activation model was used to trigger SCZ-like behavior in the offspring in control (WT) and P2X7R depleted mice (KO). Maternal intraperitoneal drug injections with 20mg/kg Poly (I:C) activates the immune system in pregnant mice. We examined its phenotype in absence and presence of the receptor in behavior, with a battery of behavioral test related to cognition (spatial working memory and novel object recognition) and sensorimotor performance (exploration, acoustic startle reflex and prepulse inhibition) in young adult mice. Results: MIA recapitulated some aspects of schizophrenic-like phenotype, such as deficits in cognition in WT-treated animals, but not in the KO-treated mice. Conclusion: Maternal insults compromised normal neuronal development and behavior in WT-treated animals but not in KO-treated animals, therefore endogenous activation of P2X7R seems to contribute to some behavioral deficits in SCZ.



Live talk session 4

The Impact of Stress and Personality on Learning

Delacoux Mathilde & Guenther Anja

Max Planck Institute for Evolutionary Biology

Stress is known to have an impact on cognition, with mildly stressful situations improving learning abilities, while strong or chronic stress impairs them. If a specific situation is perceived as stressful or not and the way an organism reacts to it could be different from one individual to another through some intraspecific variation. We therefore investigated two personality traits (stress coping in an open field (OF) test and exploration in a novel environment (NE) test) and spatial learning abilities in a low-stress and a mildly stressful maze with a group of 30 female wild mice. For each test, stress has been assessed by measuring body temperature with infrared thermography. Learning abilities were not significantly repeatable between both tests, which indicates that the stress level has a great influence on learning. There were some correlations between personality and learning measures in the mildly stressful maze: explorative (NE) and more stressed (OF) individuals are better learners. However, no correlation has been found between personality and the low-stress maze. This could suggest that in a mildly stressful situation, learning is more influenced by personality traits as exploration and sensitivity to stress than in a low-stress situation. These findings could explain some of the contradicting findings regarding personality-cognition links plaguing the literature and argue for very careful design of cognitive test setups especially in non-model species.



Live talk session 4

Exploring links between personality and environmental traits in wild poison frogs

Mélissa Peignier (1,2,3), Yimen G. Araya-Ajoy (4), Lauriane Bégue (3,5), Sarah Chaloupka (6), Katharina Dellefont (3), Christoph Leeb (2,7,8), Max Ringler (1,3,6,9), Eva Ringler (1,2,3)

(1) Division of Behavioural Ecology, Institute of Ecology and Evolution, University of Bern, Switzerland;

(2) Messerli Research Institute, University of Veterinary Medicine Vienna, Austria;

(3) Department of Behavioral and Cognitive Biology, University of Vienna, Austria;

(4) Centre for Biodiversity Dynamics, Department of Biology, Norwegian University of Science and Technology, Trondheim, Norway;

(5) Department of Biology and Ecology, University of Montpellier, France;

(6) Department of Evolutionary Biology, University of Vienna, Austria;

(7) iES Landau, Institute for Environmental Sciences, University of Koblenz-Landau, Germany;

(8) Central Research Laboratories, Natural History Museum Vienna, Austria;

(9) University of Music and Performing Arts Graz, Austria

An animal's behavioural phenotype comprises several traits, which are hierarchically structured in functional units. This is manifested in measured behaviours often being correlated, partly reflecting the need of a coordinated functional response to an individual's general physiological state and socio-ecological environment. Quantifying the structure of behaviour and how it is related to an individual's environment is key to understand its role in the ecology and evolution of organisms. In the present study, we quantified behaviours in a wild, free ranging population of the neotropical frog *Allobates femoralis*. We investigated how these behaviours were linked to the natural and social environment, and if there is evidence for animal personality. We aimed at assessing aggressiveness, exploration, and boldness by measuring several behaviours expressed in a set of experimental assays, to then study the correlations between the different behavioural traits and their relationship with their natural and social environment. Our measurements indeed reflected the hypothesized personality traits. Finally, we found non-random spatial patterns in the distribution of behavioural phenotypes across the population, which might reflect how individuals cope with their socio-ecological environment.



Live talk session 4

Personality predicts Behavioural Lateralization in a Population of Wild Zebrafish

Danita K. Daniel & Anuradha Bhat

Department of Biological Sciences, Indian Institute of Science Education and Research Kolkata

Behavioural lateralization has been extensively studied across several taxa, with behaviours such as predator avoidance, social inspection and even mating related interactions being exclusively controlled by one side of the brain or the other. It is a phenomenon of particular interest in cognitive studies, as organisms which show greater laterality are known to perform better in cognitive tasks. We measured behavioural lateralization in wild-caught zebrafish, using multiple stimuli in detour and rotational bias tests and also performed tests to characterise the personality of individuals across various axes. We found that individuals demonstrated behavioural laterality with an innate preference to either turn left or right, as well as consistency in personality. Fish showing a more proactive personality (bolder, more exploratory, more aggressive, more active and less sociable) also displayed greater behavioural lateralization, which could be indicative of better cognitive ability. Although a correlation between personality and cognition has been demonstrated in various contexts for many organisms, the underlying mechanistic processes that might govern it have remained obscure. A strong correlation between personality (and thereby cognition) with behavioural lateralization in our study indicates that they are governed by similar brain functionality. This, thus, provides a vital piece of understanding about adaptive mechanisms that organisms use to thrive in their habitats.



Pecha Kucha session 4

Rationality of Shoaling Group Size Choices in Zebrafish (*Danio rerio*)

Abhishek Singh (1), Kajal Kumari (2), Bittu K Rajaraman (1)

(1) Department of Biology, Ashoka University, Sonapat, Haryana, India

(2) Department of Collective Behaviour at University of Konstanz/Max Planck Institute of Ornithology, Konstanz, Germany

Animals, from unicellular organisms to humans, are known to violate normative economic principles of rationality. The cognitive and neural basis of behaviours that do and do not conform to normative rationality is relatively poorly understood. Here we test whether the rationality principle of the Independence of Irrelevant Alternatives (IIA) is upheld in shoal size choice preference in zebrafish (*Danio rerio*). Zebrafish were presented with an initial dichotomous shoal size choice, with fish in a central transparent tank choosing between two out of four randomly chosen fully separate rectangular tanks containing display fish. The invariance of their relative preference was compared to conditions where a trichotomous choice was added. The values varied only in a single dimension of shoal size contrary to two-dimension manipulation in all other studies. Our preliminary results suggest that zebrafish violate the assumptions of rationality even in a single dimension. The study opens new possibilities to reassess the multidimensional (multi-attribute) interaction studies in the light of single-dimension violation of IIA.



Pecha Kucha session 4

What does a *Nasonia* female want?

Babita Choudhary

Department of Biological Sciences, Indian Institute of Science Education and Research Mohali

Our study aims to understand the patterns of sexual variation between *Nasonia* species. To quantify such variations, estimating quantitative behavioural parameters of the trait is essential. Parasitoid *Nasonia* a group of four closely related species, is used as a model. The major question of our study is to look for the parameters based on which a female selects a mate. First, we compared the courtship behaviour of the four sibling species. Recorded the courtship behaviour under a dissecting light microscope keeping temperature, light and the age of the wasp constant. Secondly, we looked at the hetero-specific male acceptance by females as well as the difference in the level of hetero-specific male acceptance after transferring the male extracts of one species male to another via Dichloromethane. Although the species are morphologically similar, yet there are distinct differences in the length of courtship cycles, the number of head-nods, antennal sweeps, wing fluttering etc. Our study shows that species can often be distinguished based on the level of hetero-specific male acceptance, which changes with the male extract transfer. From our experiments, we can conclude that in the case of two species, females select their mates using male extract as a parameter, which is not true for the remaining two. We are trying to find out the possible parameters which are preferred by the females of the other two species during mate selection.

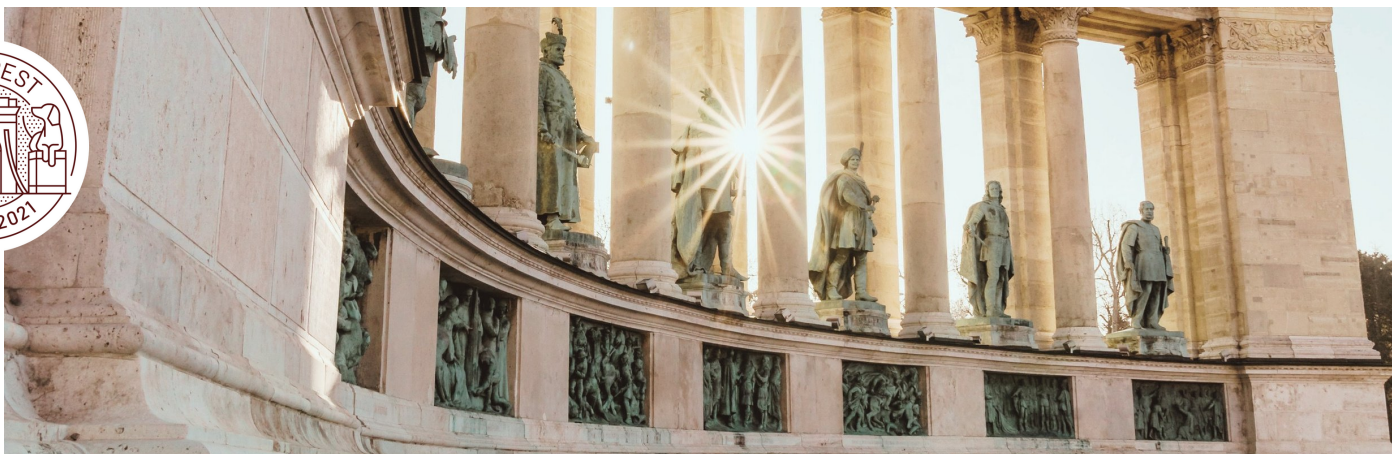


Pecha Kucha session 4

Public perception of reptile welfare and cognition

Agnese Crisante, Oliver Burman, Anna Wilkinson
University of Lincoln

Reptiles are becoming increasingly popular as pets. Unfortunately, this increased popularity has seen a concomitant rise in poor reptile health and high morbidity and mortality rate. Since there is a link between how an animal is perceived and the way in which is treated in captivity, this study aimed to understand what the general public currently thinks and knows about reptile cognitive abilities and welfare needs. Public opinion was collected with an online questionnaire; half of the participants were reptile owners, the other half had never had a direct experience with reptiles. The goal was to highlight any differences of opinion and knowledge between reptile owners and non-owners about the essential requirements of reptiles in captivity and their cognitive abilities. In addition, participants were required to provide a score for a range of different pet species for a variety of cognitive abilities; in this way, a comparison could be made between the public perception of reptile cognitive capabilities and those of other pet species. Our results showed that reptile owners, compared to non-owners, assigned higher scores to reptile cognitive abilities and were more informed about reptile welfare requirements in captivity. The analysis comparing the cognitive abilities of different pet species showed a clear pattern: mammals were scored higher than any other animal group, with the overall score following the phylogenetic scale.



Elevator speech session 4

Who is a curious pig? Individual variation in family pigs' response to novelty

Paula Pérez Fraga (1,2,3,4), Bence Ferdinady (1,4), Máté Nagy (3,6,7),
Göksel Keskin (3,7), Linda Gerencsér (1,2), Attila Andics (1,2)

(1) Department of Ethology, Eötvös Loránd University, Hungary

(2) MTA-ELTE 'Lendület' Neuroethology of Communication Research Group, Eötvös Loránd Research Network, Hungary

(3) MTA-ELTE 'Lendület' Collective Behaviour Research Group, Eötvös Loránd Research Network, Hungary

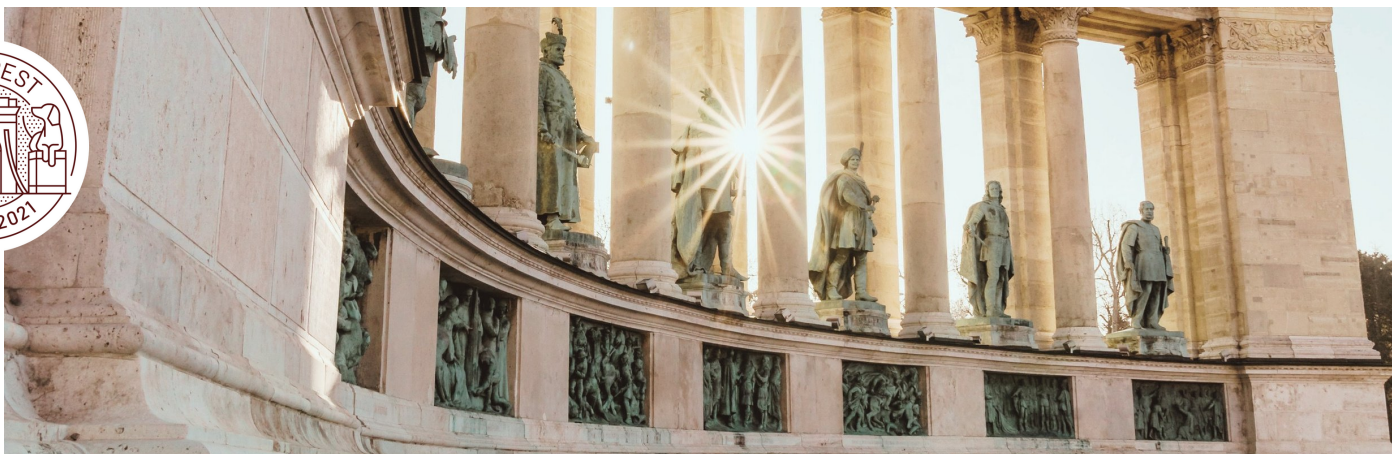
(4) Doctoral School of Biology, Institute of Biology, ELTE Eötvös Loránd University, Budapest, Hungary

(5) MTA-ELTE Comparative Ethology Research Group, Eötvös Loránd Research Network, Hungary

(6) MTA-ELTE Statistical and Biological Physics Research Group, Eötvös Loránd Research Network, Hungary

(7) Department of Biological Physics, Eötvös Loránd University, Hungary

Response to novelty (e.g. locomotor activity and exploration of new objects) is widely used as a behaviour measurement in personality studies of farm pigs. However, no conclusive results have been obtained about the consistency of individual responses to novelty across time. The use of motion sensor devices can help to measure accurately the locomotor response of the animals. Our aim was to assess individual variation in family pigs' response to novelty based on their exploratory behaviour and locomotor activity as well as to measure the consistency in time of this behaviour. We hypothesized that pigs can be individually characterized by their response to novelty. We tested N=9 pigs, both sexes at 4, 8 and 12 months old in 3 rooms, with novel objects on the floor. In every room, the pig was let free to explore. We have recorded the behaviour using video cameras and a harness-worn motion sensor device. Preliminary behaviour results show that the object-oriented behaviours are strongly correlated at 4 and 8 months but weakly correlated at 12 months of age. This points to the existence of individual behavioural consistencies in family pigs' exploratory behaviours over time, especially during the first steps of development. Moreover, each pig showed a specific pattern in its exploratory behaviour which suggests that pigs could be individually characterized by their reactions to novelty. Further analysis will be focused on the activity measured by the motion sensor.



Elevator speech session 4

Domestic cat personality dimensions assessed by an online survey of Italian cat-owners

Tsighie Venturini (1), Filugelli L. (2), Normando S. (3), Bonetti O. (4),
Toson M. (2), Contalbrigo L. (2)

(1) Scuola di Agraria e Medicina Veterinaria, University of Padua, Italy;

(2) National Reference Centre for Animal Assisted Interventions. Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro (PD), Italy;

(3) Department of Comparative Biomedicine and Food Science, University of Padua, Legnaro (PD), Italy;

(4) Zampa Trentina Association, Trento, Italy

Personality dimensions are described in a wide array of animal species (Stamps and Groothuis, 2010). The aim of this online survey was to identify personality dimensions in a sample of Italian privately owned cats and to assess whether owners' satisfaction was affected by the characterizations of the cats on such dimensions. Cat owners were recruited using social media with a snowball sampling method. Respondents were instructed to assign a score in a 7-points Likert scale (from 1 "not at all" to 7 "very much") to each of 48 listed adjectives (similar to Litchfield et al., 2017), based on how much it represented their cat, and to score their satisfaction with their cat on a 0 to 10 scale. A Factor Analysis on 3.931 responses resulted in 5 factors explaining 53.54% of the variance. The factors identified in our sample were: Neuroticism (characterised by adjectives such as tense, anxious, shy), Openness (curious, playful, interested in novelty), Dominance (dominant, jealous, irritable), Impulsiveness (erratic, impulsive, reckless), Awkwardness (clumsy, distracted, submissive). Maximum scores in satisfaction were associated to higher scores in Openness and Awkwardness and lower scores in Neuroticism, Dominance and Impulsiveness (Wilcoxon Rank Sum test, all $p < 0.001$). Reference: Stamps J. Groothuis T.G.G. The development of animal personality: relevance, concepts and perspectives. Biol. Rev. (2010), 85, 301–325, doi:10.1111/j.1469-185X.2009.00103.x



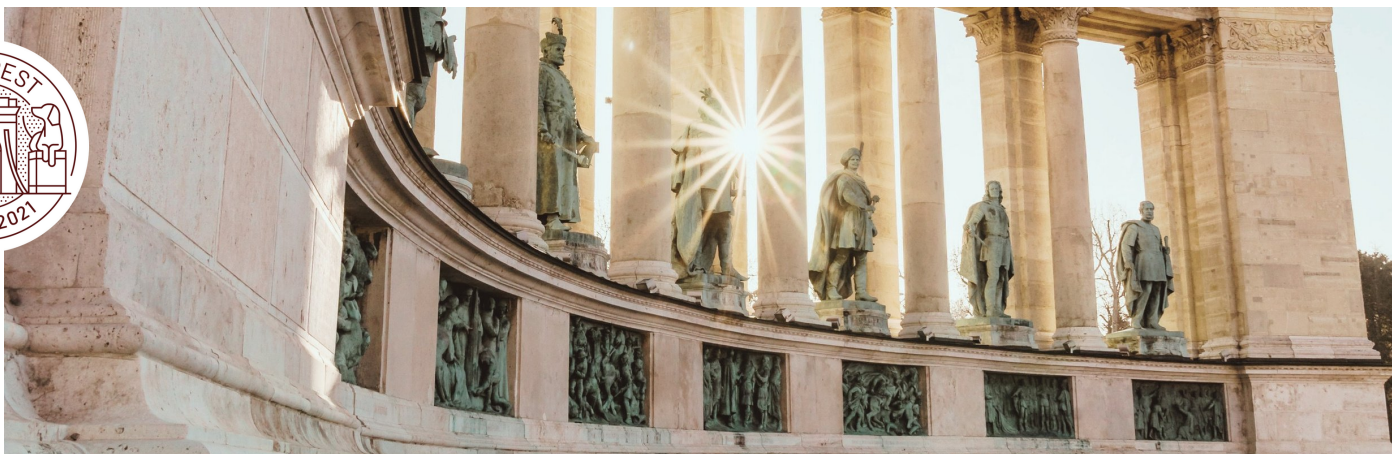
Elevator speech session 4

Personality and brain laterality in common marmosets (*Callithrix jacchus*)

Masilkova Michaela, Šlipogor Vedrana,
Lima Marques Silva Guilherme Henrique, Bugnyar Thomas

Department of Behavioral and Cognitive Biology, University of Vienna; Czech University of Life Sciences Prague; Department of Zoology, Faculty of Science, University of South Bohemia

The research on animal personality (i.e. behavioral responses that are consistent over time and/or contexts and/or situations) has gained increasing attention in behavioral and cognitive biology in recent years. In addition to animal personality, brain laterality has also been used as a measurable variable on which it is possible to assess consistent animal behavior. Consequently, previous research has investigated the relationship between personality and hemispheric brain dominance in primates. For example, a specific hemispheric brain dominance (i.e. on motor activity) has been associated with the display of fearfulness and avoidance behavior towards novel objects and predator alarm calls. Therefore, this project's main objective was to investigate and validate previous analyses on the relationship between individual personality traits and brain laterality in common marmosets. The initial phase consisted of the collection of behavioral data through direct observations via video recording. The second aim was to collect the data regarding brain lateralization (i.e. hand preference index). The obtained results will contribute to the overall knowledge on personality and brain laterality by employing direct behavioral observations and behavioral coding (within the social context). Moreover, the personality assessment method conducted during the course of this analysis will contribute to the cross-validation (and comparison) of different methods on personality assessment.



Elevator speech session 4

Magnitude effect and spatial numerical bias in middle identification: evidence from rhesus monkeys (*Macaca mulatta*)

Zhaoying Chen, Michael L. Platt, Elizabeth M. Brannon, Rosa Rugani

(1) Department of Psychology, School of Arts and Sciences, University of Pennsylvania, Philadelphia, PA, USA;

(2) Department of Neuroscience, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA;

(3) Marketing Department, The Wharton School, University of Pennsylvania, Philadelphia, PA, USA, Philadelphia, PA, USA;

(4) Department of General Psychology, University of Padua, Padua, Italy

A plethora of studies has established animal numerical competence, but fewer researches have investigated animals' abstract numerical concept of middle. Here we explored whether rhesus monkeys (*Macaca mulatta*) can flexibly abstract a strategy to identify the middle item in series of discrete identical items. We designed a video game and trained two monkeys to select the middle dot in a horizontal sequence of three items. To test whether they were able to transfer the learnt abstract middle rule, we showed monkeys new stimuli comprising 3, 5, 7, or 9 items. The results showed that both monkeys chose the middle items above chance level. Remarkably, their accuracy increased as the magnitude decreased. Then, we investigated whether monkeys' attention toward the left or the right was affected by numerical magnitude. Monkeys showed individualized attentional bias, either left-to-right or right-to-left oriented. These findings demonstrate that monkeys can extract an abstract rule to bisect numerical series. This ability should be considered part of the cognitive abilities supported by the non-symbolic numerical system.



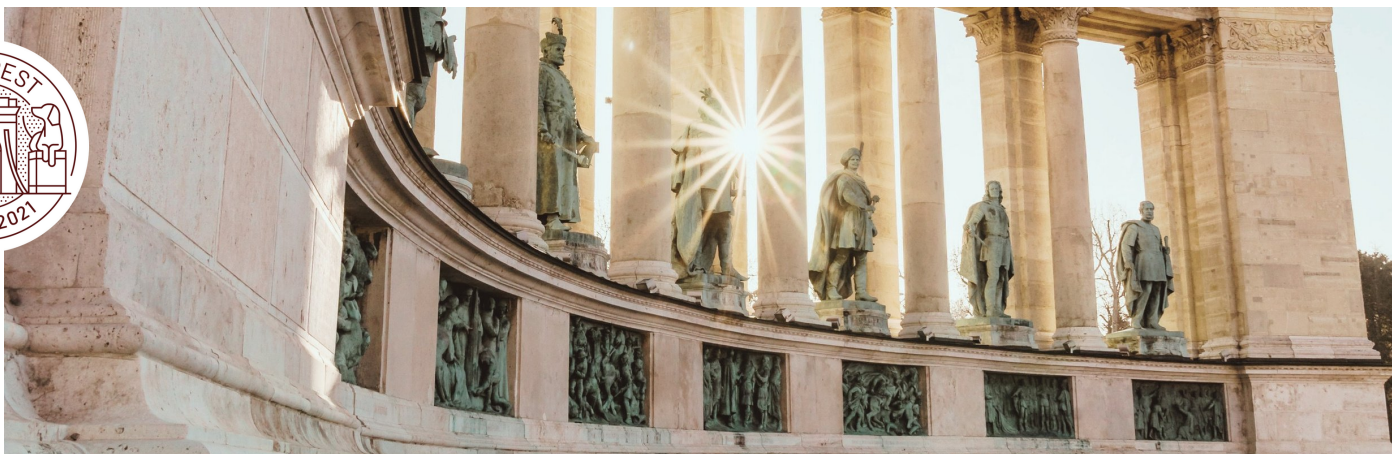
Elevator speech session 4

Multisensory stimulation for the treatment of hydrocephalus behavioral sequelae in a geriatric canine patient

Cecília Carreiro

University of Bordeaux, France

Dog behavioral problem has always been frequent but prejudice has prevented treatments of their cognitive deficits. To rehabilitate a dog with idiopathic communicating hydrocephalus (ICH) sequelae a systemic approach was developed based on the species and the individual. A 16-year-old dachshund had seizure after her annual vaccination what had always occurred but only for a day and solving spontaneously. A week later she started receiving an ICH conservative treatment. After discharge severe cognitive-dysfunction-syndrome-like disturbances remained. The systemic approach involved multisensory stimuli as voice command (obstacle detour), olfactory (exploration induced by food, stranger's odor acceptance) and touch receptors stimuli (massage). In 13 sessions behavioral (odor response latency, bite frequency, sound and touch stimuli reaction) and physical (distance walked in straight line, falling frequency) parameters were assessed. Owner's report of dog's behavior and urinary function between the sessions was assessed. After 3 sessions all parameters improved and lasted so until patient's recovery (3 months). Results showed a rapid positive response to the systemic approach allowing the patient's rehabilitation and potential clinical use of the protocol developed for nervous system severe damage. The treatment was simple and low cost increasing the acceptance of the dog and the owner. Behavioral parameters allowed a clinical follow-up of post-lesion plasticity in geriatric dog.



Live talk session 5

Counting on Numbers – Numerical Abilities in Sharks and Stingrays

Carolyn Niederbremer, Nils Kreuter, Nele Christofzik, Janik Bollé,
Vera Schluessel

University of Bonn, Zoology Institute, Cognition Lab; University of Göttingen

The ability to discriminate quantities is a widespread cognitive skill found in a variety of animals, presumably due to the advantages it yields for many behaviours including foraging, mating, and predator avoidance. Over the last decade, studies examining the cognitive abilities of fish have increased, including studies testing the ability of fish to discriminate quantities of items and determine whether fish can solve tasks solely on the basis of numerical abilities. This study is the first to investigate this ability in two elasmobranch species and adds to the growing number of studies on fish that are key to understanding the evolution and development of cognition in vertebrates. All animals were trained in two-alternative forced-choice visual experiments in which they were presented with different quantities of two-dimensional geometrical symbols. Successful animals were subsequently examined in transfer tests to determine if previously gained knowledge could be applied to new tasks. Results show that the grey bamboo shark (*Chiloscyllium griseum*) and the ocellate river stingray (*Potamotrygon motoro*) can discriminate quantities based on numerical information alone, while continuous variables were controlled for. Furthermore, the data indicates that similar magnitudes and limits for quantity discrimination exist as in other animals.



Live talk session 5

Into the reptilian Umwelt: The effect of chemical versus visual information on the learning performance of lizards

Alexandros Vezyrakis (1,2), Gilles De Meester (2), Raoul Van Damme (2)

(1) Université Bourgogne Franche-Comté, (2) University of Antwerp

Within cognitive research, there exists the danger of designing experiments that fit our anthropocentric world view but fail to fully consider a species' ecology and life history. Proper cognitive tasks using a species' sensory ecology are necessary to fully understand the extent of its cognitive abilities and their ecological relevance. In reptiles, most studies have been limited to learning visual discriminations, despite the fact that chemical cues are hugely important in their ecology. Hence, the exclusive use of visual cues in previous studies may have led to underestimations of reptilian cognitive abilities. In this study, we aimed to test how cue type would affect the learning success of common lizards (*Zootoca vivipara*) in a discrimination task. The lizards were given one type of cue (colour or odour) and after learning to make the correct choice, the test was repeated using the other cue type. Our results show that lizards were able to learn both using visual and chemical cues and switch between them. To our knowledge, this is the first evidence that associative learning is possible with olfactory cues in lizards. Our animals performed better when given colour cues compared to when given odour cues, suggesting a complex link between sensory perception and cognition. Further research is required to diminish human biases and improve our insight into the effects that a species' umwelt has on their perceived cognitive abilities.



Live talk session 5

Individual stability but low population diversity of whistles from Indian Ocean bottlenose dolphins (*Tursiops aduncus*)

Rachel Probert (1,2), Angie Gullan (3), Diana Rocha (3,4), Sasha Dines (2), Tess Gridley (2,5)

(1) School of Life Sciences, University of KwaZulu-Natal, Durban, 3629, South Africa;

(2) Sea Search Research and Conservation NPC, 4 Bath Road, Muizenberg, Cape Town, 7945, South Africa;

(3) Dolphin Encountours Research Center, Ponta do Ouro Partial Marine Reserve, 0025, Mozambique;

(4) School of the Environment, Geography and Geosciences, University of Portsmouth, Portsmouth, PO1 2UP, United Kingdom;

(5) Department of Botany and Zoology, Faculty of Science, Stellenbosch University, Stellenbosch, 7605, South Africa

Common bottlenose dolphins (*Tursiops truncatus*) use individually distinctive signature whistles during social interactions to facilitate group cohesion. There is also evidence that Indian Ocean bottlenose dolphins (*T. aduncus*) may use signature whistles, however studies from wild populations are limited. We therefore investigated signature whistle use from a resident population of *T. aduncus* from southern Mozambique, focusing on temporal stability and individual distinctiveness, two defining features of signature whistles. Video and audio data were collected from 2009-2020 during swim-with encounters. Over the study, 15 individuals were recorded more than once across 50 encounters. Of all documented whistles, 66.4% were produced in bouts of stereotyped whistles. Automated categorization of the extracted fundamental frequency of whistle loop contours using an unsupervised artificial neural network demonstrated temporal stability for up to nine years in seven dolphins. However, in a global categorization comparing all contours, those produced by different dolphins were frequently categorized together. Temporal stability in contours but low individual distinctiveness may be explained by use of a shared whistle repertoire or identity encoding in subtle contour features, requiring fine scale discrimination and acute auditory perception. Widespread geographic investigation into signature whistle use may demonstrate variation in acoustic systems for bottlenose dolphins.



Pecha Kucha session 5

Signature whistles of the bottlenose dolphins inhabiting the Ligurian sea

Francesca Terranova (1), Guido Gnone (2), Olivier Friard (1), Michela Bellingeri (3),
Cristina Giacomini (1), Livio Favaro (1)

(1) Department of Life Sciences and Systems Biology, University of Turin, Turin, Italy

(2) Acquario di Genova, Area Porto Antico, Ponte Spinola, Genoa, Italy

(3) Fondazione Acquario di Genova, Area Porto Antico, Ponte Spinola, Genoa, Italy

Bottlenose dolphins (*Tursiops truncatus*) are incredibly social animals that live in fission-fusion societies characterised by different social units that can merge into the same group (fusion) or split into smaller groups (fission), thus making the group size and composition dynamic and fluid over time. Accordingly, bottlenose dolphins show a complex vocal communication system mediating social interactions. To exploit group cohesion among individuals (particularly in the mother-calf relationship), dolphins use the signature whistle (SW): a narrowband sound with individually distinctive frequency modulations that broadcast individual identity information. Our study investigated the acoustic structure of the SWs of the bottlenose dolphins inhabiting the Ligurian Sea (NW Italy) within the Pelagos Sanctuary. Through visual categorisation of spectrograms, we identified 469 SW using the SIG-ID method. We further grouped these into 19 different categories based on their stereotyped frequency modulation patterns. Furthermore, we observed differences when comparing the acoustic features of these whistles with those of other different demographic units available from the literature. Overall, this study characterises the SWs of the demographic unit of bottlenose dolphins inhabiting the Ligurian sea for the first time. This new characterisation of SWs will help to shed light on the variability of the whistles signalling and the mechanism underpinning dolphins' communication.



Pecha Kucha session 5

Maned wolf simultaneous vocalization

Bruna Paula & Patrícia Monticelli

Ethology and Bioacoustics Lab - University of São Paulo, Ribeirão Preto, Brazil

The Near Threatened maned wolf *Chrysocyon brachyurus* is a South American endemic canid occurring mainly in grassland-dominated regions. The species is considered shy and mainly nocturnal and crepuscular. The maned wolf produces high-amplitude, long-distance calls (roar-barks) which are emitted in sequences and hypothesized to have 2 functions: to space individuals of the same sex; and to maintain contact between pair-mates, especially during the breeding season and when young are present. The study was conducted in Ecological Station of Itirapina located on Itirapina, São Paulo, Brazil. Data were collected during 6 months. We selected two sites covering an area of 8 km² of the ESI according to estimation of roar barks propagation. The sites selection was according to localization of the train track, an important reference point to evaluate the railway noise effect. The distance between the sound recorders was 4,000 meters from each other, avoiding overlapping between the sites. Sound recordings were obtained from passive acoustic monitoring systems (PAM). The evaluation data set comprised 600 hours of file recordings. The sound records files were analyzed manually, scanned with visual and aural inspection of spectrograms. The simultaneous vocalizations were composed of 26 roar-barks in an interval of 1 min. We register the simultaneous vocalizations on 19 June 2016 and started around 6:00 pm.



Pecha Kucha session 5

Effects of Age, Training, and Number of Dogs in the Household on Inequity Aversion in Dogs

Kia Radovanovic (1), Jim McGetrick (2), Friederike Range (1)

(1) Domestication Lab, Department of Interdisciplinary Life Sciences, Konrad Lorenz Institute of Ethology, University of Veterinary Medicine, Vienna, Ernstbrunn, Austria

(2) Institute of Animal Welfare Science, Department for Farm Animals and Veterinary Public Health University of Veterinary Medicine, Vienna, Austria

The factors influencing inequity aversion, the negative reaction to unequal outcomes, have received limited attention. Thus, we do not know much about the development or expression of inequity aversion in dogs. Considering the hypothesis that inequity aversion co-evolved with cooperation, the number of dogs living together likely influences their number of cooperative interactions and may therefore influence the development of inequity aversion. Moreover, age and training impact a variety of cognitive abilities in dogs, but their effect on inequity aversion has not been investigated. We hypothesized that all three variables have an influence on the expression of inequity aversion. We used data on 76 subjects from past studies of inequity aversion in dogs. Data on age, training, and dogs in the household was gathered using a questionnaire for owners. The response to inequity aversion was assessed by asking a subject and partner dog to give the paw. The partner was always rewarded for completing the task, but the subject was rewarded based on the condition being tested. We analyzed the influence of age, training, and number of dogs in a household on the latency to stop giving the paw in each condition. A Cox proportional hazards model revealed no significant effects on inequity aversion. These findings do not support the hypothesis that inequity aversion co-evolved with cooperation but do indicate that inequity aversion is a stable trait unlikely to be influenced by experience.