

5 PhD Positions in Animal Cognition and Communication

In recent years, Vienna has become an important center for behavioral and cognitive research, with a strong research focus on comparative cognitive biology. The Austrian Science Fund (FWF) and the University of Vienna have supported this development, by funding a multi-level, integrative PhD training programme (DK) on cognition and communication in humans and non-human animals.

The goal is to train graduate students to understand cognition from a biological viewpoint, with a focus on how animals solve real-world problems, such as dealing with conspecifics in daily social life. Communication is studied as a window into social cognition, allowing us to design experiments, which test specific hypotheses developed through an innovative combination of field observations and experiments, and laboratory work on humans and other animals.

The PhD positions are fully paid by the Austrian Science Fund (FWF) and are based at the Faculty of Life Sciences, University of Vienna. It includes five faculty members (T. Bugnyar, W.T. Fitch, W. Hödl, L. Huber, K. Kotrschal) and integrates behavioral studies of multiple aspects of cognition and communication. Although cognition research traditionally tends to focus on mechanisms, this programme explicitly incorporates all four of Tinbergen's levels of analysis (phylogeny, adaptation, causation, ontogeny).

The trainees will learn to study animal and human behavior in a variety of cognitive and ethological frameworks - focused on social cognition and communication - in both the laboratory and in the field and will work with a diversity of model species including amphibians (frogs, salamanders), reptiles (tortoises, lizards), birds (pigeons, corvids, parrots), canids (wolves and dogs), humans, and nonhuman primates (squirrel monkeys, marmosets). See the following website for more information: cogcom.univie.ac.at

Letters of application including CV, photograph, publication list, 2-3 letters of recommendation and a statement of research interests should be sent to Mrs. Petra Pesak, Department of Cognitive Biology, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria. Applications by email are particularly welcome (petra.pesak@univie.ac.at). The application deadline is February 15, 2011.

The University of Vienna promotes the employment of women in fields of work in which they are underrepresented and therefore encourages qualified women to apply to this opening. Disabled people will be preferentially treated if qualified.

Desired qualifications

- A master or an equivalent in Biology or related fields
- Excellent knowledge of English as the programme language
- Field experience for specific projects (e.g. on frogs)
- Designing and conducting learning experiments
- Demonstrated aptitude for technological skills as video-/audio recording and analyses, computer programming, hormone analyses

Scientific interests

Animal cognition, multimodal communication, bioacoustics, learning theory, analogical reasoning, categorization, cooperation (foraging), social hunting, behavioral and vocal physiology, social knowledge, social learning, attachment / bonding, pattern perception, evolution of language and music

Potential PhD Projects

Conflict Management in Corvids

Project 1/ Thomas Bugnyar:

Dealing with conflicts is a major challenge for any socially living species. Individually based, flexibly-used skills to prevent conflicts and/or buffer their effects have been studied almost exclusively on mammals, i.e. primates. Recent findings suggest that patterns like third-party intervention, coalition formation, reconciliation and consolation may be also found in captive corvids. However, it is unclear a) to what extent different species rely on which of those strategies, b) whether or not they are based on the same cognitive mechanisms and c) how these strategies are affected by different degrees of fission-fusion dynamics.

The project supervised by Thomas Bugnyar shall include an observational part, focusing on conflict management strategies of individually marked birds in wild populations of ravens and carrion crows, and an experimental part, manipulating the context (likelihood of aggression via distribution of resources) and the information accessible for bystanders (via playback of simulated encounters). Experiments shall be conducted mainly in captivity, on a total of four species (ravens, carrion crows, rooks and jackdaws). Observations shall be conducted in the area of the Cumberland Wildpark Grünau, in the Northern Austrian Alps (ravens), in the area of Schönbrunn Zoo in Vienna (carrion crows) and in Leon, Spain (cooperatively breeding population of carrion crows).



Project 2/ Tecumseh Fitch:

A) Acoustics of Individual Displays in Ravens

The trainee is supervised by Tecumseh Fitch and will conduct detailed analysis of the highly idiosyncratic and multimodal displays of adult ravens from both structural/acoustic and gestural perspectives. We will use principles of vocal production to analyze the use of source and filter components in these displays and use repeated measures analysis within birds to extract the reliability of these different cues. We will then use touch-screen experiments to explore ravens' classification of calls whose acoustic and visual properties are experimentally varied. Finally, we will perform a combined environment/genetic analysis to analyze how these different aspects of displays are driven by upbringing and by genetics, and thus how the uncovered acoustic cues may provide reliable cues to genetics, provenance, and individual identity.



Or

B) Mechanisms and Perception of Vocalization in Canids

The trainee is supervised by Tecumseh Fitch and will start with a thorough exploration of canid vocal production (both source and filter components, cf); the second step will be construction of a dog vocal tract model and synthesizer. This tool will then be used in playback experiments to generate synthetic stimuli, to gain understanding of the various acoustics cues present in dog growls, barks, whines and howls, and how these are perceived and categorized by other listening dogs.

Project 3/ Walter Hödl:

Acoustic and Spatial Neighbor Recognition in Poison Frogs

Based on our knowledge of call parameters carrying the potential for individual recognition (Gasser et al. 2009), play-back experiments in the field will test for a possible dear-enemy effect in the highly territorial and acoustically very active Brilliant-thighed Poison Frog. *Allobates femoralis* has been the main bioacoustic study object of W. Hödl, supervisor of this project, for over 20 years. Field studies will be organized in the CNRS station Pararé, Nouragues, French Guyana, where we have been working in collaboration with South American, French and US colleagues for over 20 years.

A genotyped population of *A. femoralis* will be established on a yet unpopulated river island across the field station Pararé in 2011. This closed population will allow the study of various aspects of the population genetics, behavior and ecology of *A. femoralis* without disturbing effects of migration in a naturally delimited research area. Foci of the PhD-project will include adult and juvenile orientation, neighbor recognition, space use and communication while other students will analyze genetic drift, bottleneck and founder effects. In addition to field observations, *A. femoralis* will be kept (and bred) in the Vienna lab to study kin and individual recognition based on acoustic and visual traits.



Project 4/ Ludwig Huber:

Analogical reasoning in birds (*keas, ravens, pigeons*)

One of the most controversially debated topics about animal pre-linguistic abilities is the ability of analogical reasoning (reasoning based on the inference that if two or more things agree with one another in some respects it is likely that they will agree in others). Until now, only language-trained animals have unequivocally shown this ability. The project supervised by Ludwig Huber, aims at elucidating the relationship between the cognitive and communicative aspects of this ability.



Among birds, corvids and parrots are prime candidates for advanced cognitive abilities. For comparative avian cognition, these two groups are particularly interesting as their cognitive abilities are most likely the result of convergent evolution. These two large-brained birds shall be compared to pigeons, which have shown to be surprisingly competent in terms of picture discrimination and categorization, but less so in abstract and analogical tasks.

Project 5/ Kurt Kotrschal

A) The Social Components and Physiology of Cooperative Hunting in Grey Wolves

Wolves elaborately cooperate over raising offspring, hunting and territorial defence. Social carnivores may indeed be superior to apes or monkeys as models for investigating the biology of cooperation. This PhD project supervised by Kurt Kotrschal would make use of a unique resource worldwide, provided by the Wolf Science Centre: more than a dozen well trained grey wolves and a number of equally raised dogs can be employed in a variety of experiments. A treadmill allows to stage experimental social



hunts. Basic questions are how much energy different individuals would invest in hunting, how that affects their readiness to share food and to cooperate in other tasks after the hunt, how personality, sex, life history or social context affect investment in hunting, etc.

OR

B) Dog-human relationships

We recently showed that the relationship between dogs and their owners and the practical operability of dyads mainly depends on owner personality and attitude as well as dyadic sex distribution. For example, owners high in “neuroticism” (NEO-FFI-axis 1) maintained an affective relationship with their dogs, appreciating them mainly as social supporters. Their dogs showed low cortisol values, but the dyadic performance in a practical task was also low. Human-animal dyads indeed, provide model insights into the principles of long-term vertebrate dyadic relationships.