Institute: Institute of Biology Leiden (IBL)

Project title: The linguistic abilities of birds

Abstract
Considering its complexity, there is no match for language among animal communication systems. However, learned complex vocal signals, consisting of rapidly produced, structured sequences of vocal units (‘syllables’), do occur in several groups of birds (e.g. songbirds, parrots). In our research group we examine whether some cognitive traits that are considered to be related to, or unique for, language learning and speech perception are present in birds. This project will provide a student with the opportunity to address a specific question in this area, for example, whether birds are able to learn abstract ‘rules’ related to the grammar rules underlying language; or whether birds show similar perceptual sensitivities to (speech) sounds as humans have and categorize such sounds in the same way. Carefully designed experiments will be used to reveal the cognitive mechanisms involved in such abilities and to examine the similarities and differences with how humans process speech and language.

Background
Language as present in humans is a unique trait in many ways. This makes understanding its origin and evolution one of the most challenging and unresolved scientific questions. One of the debates on language evolution concerns whether particular processes involved in speech processing or syntax learning are uniquely human abilities or involve, or arise from, domain general cognitive abilities also present in other species. Hence comparative research addressing which cognitive abilities, or to what extent, can be found in other species and how comparable they are to those in humans is of critical importance. In contrast to our closest relatives, the great apes, which show nothing like the vocal complexity as shown in humans, song of songbirds does share several features with language. This is why the larger research program of which this project will be part, has a focus on birds.

Aims
To provide insight in the cognitive abilities of birds and their similarity to those of human in the context of vocal processing. Based on this: to provide hypotheses as to how certain features of language might have evolved.

Study design and methods
This subject offers several options for specific projects, the details of which will be developed together with the candidate. The approach will be to use behavioural experiments, in which birds (zebra finches, budgerigars) are trained and tested to
analyze how they discriminate, or learn about, auditory stimuli. This is done using so-called ‘Go-Nogo’, ‘two-alternative-choice’ and other experimental conditioning techniques. Stimuli can be speech sounds, song elements or others, which are edited using sound analysis and editing programs.

Clinical and/or scientific relevance
The project will shed light on the cognitive basis of one of the most characteristic human behaviours. It will also provide insight in the cognitive abilities of birds, some of which are considered comparable to those of primates. As bird brains and mammal brains are differently structured such comparisons are also of great interest and relevance to understand whether similar traits are the result of convergence or common descent.

Requirements of candidate
MSc in (Animal) Biology, experience with data analysis and statistics. Interest in animal behaviour and cognition.

Required English proficiency (passed one of these tests with the following minimum scores):
- IELTS test: 7 (academic test not the general one)
- TOEFL test, paper-based: 600
- TOEFL test, computer-based: 250
- TOEFL test, internet-based: 100

Supervisor information
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