

Exploring the Cognitive Capacity of birds

Jonas Rose

Animal Physiology, Institute for Neurobiology, Eberhard-Karls University of Tübingen, Germany

Keywords: Avian, Cognition, Crow, Working Memory

The remarkable cognitive abilities of birds, especially crows and parrots, have recently attracted growing scientific interest. Mounting data demonstrate that these birds surpass many mammals; for instance, they are capable of tool use, episodic-like memory, complex social cognition and executive control. This high level of cognitive performance of the avian brain is achieved in the absence of cortical organization. I will argue that the comparative study of the avian brain offers a unique opportunity. Here we can test in how far our models of cortical function offer insight into general biological principles, or if birds have evolved different solutions.

A core component of cognition is working memory, the ability to flexibly memorize and manipulate information over short periods of time. Working memory shows a tight limit regarding how much information can be handled simultaneously. This ‘capacity’ of working memory is often seen as a unit for general cognitive capacity and is a close correlate of individual fluid intelligence in humans. I will present a study on the capacity of working memory in carrion crows. Two crows were trained on a working memory paradigm that allowed to model capacity as a function of load on working memory. The paradigm was adapted for crows from an experiment in monkeys and allows for direct comparison between the species – at both the behavioral and the neural level. Both species show a largely independent capacity between the two visual hemifields, such that the most prominent factor in performance is the number of items memorized in one visual hemifield. Furthermore, crows show a capacity that is largely comparable to that of monkeys. This result implies that the reported cognitive abilities of birds may not reflect domain specific adaptations but that birds, like mammals evolved a high capacity system for general cognition.

Acknowledgment: This research was supported by a Volkswagen Foundation Freigeist Fellowship.