Cognition in Context

Speakers

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Introduction

The theory behind the evolution of cognition frames that cognitive processes have evolved in response to the complexity and challenges posed by the physical and social environment. To date, cognitive abilities have been mostly studied under controlled laboratory conditions that facilitate replicability and high-resolution measurements (Cauchoix, Hermer, Chaine, & Morand-Ferron, 2017). Yet, under these circumstances, cognitive abilities are evaluated in relatively stable and homogeneous situations that hardly match the species' natural environments (Niemelä and Dingemanse, 2014). Thus, results drawn from these controlled studies do not necessarily scale to the range of cognitive processes displayed by individuals in naturalistic settings (Cauchoix, Chaine, & Barragan-Jason, 2020).

Irrespective of whether studies are conducted under lab- or field-like conditions, the validity of their findings is constrained by the daily-life environment of the test subjects, the particular study context, and the choice of the experimental setting and research paradigm. For instance, the composition and structure of the group an individual grows up and lives in may shape skills that become characteristic for members of that group. Within the group, however, the same individuals may behave differently and specific to a given situation, whereby internal factors like motivation or development status, as well as external factors like the presence of an audience or identity of partners, may mediate their decisions. Therefore, to study how cognition operates, it appears essential not to dissociate it from the context in which it occurs. On the contrary, studying cognitive processes across contexts might allow to better grasp the full spectrum of species-specific abilities expressed by individuals, living in dynamic and complex environments.

In this symposium we address the need for, and benefits of, cross-contextual studies on cognition. We bring together researchers working on non-human animals and human children under lab and field conditions. Paper 1 examines how dominance relationships work in stable/dynamic raven groups; Paper 2 explores how life experiences shape dog behaviour; Paper 3 takes a closer look at factors modulating resource-control abilities in children; and Paper 4 tests marmosets' social learning skills in different social settings. Finally, our discussant will summarize the four papers, contextualize the findings in respect to research in social cognition and provide an outlook for future directions.

Structure and dynamics of dominance relationships in captive and free-flying ravens (*Corvus corax*)

Palmyre H. Boucherie, Jorg J.M. Massen, Thomas Bugnyar

In social species, individuals tend to rely on cognitive skills to navigate their social world. In particular, the formation and recognition of dominance relationships can alleviate the costs of competition by regulating the access to resources. Dominance is often studied in captivity, allowing fine-grained analyses of dyadic and third-party interactions. Less is known from wild populations, particularly in species that opportunistically form groups and where conflict avoidance might be an alternative to the use of cognition. We here report on a series of studies on ravens, a social corvid flexibly forming groups of different composition and size. We compare the structure of dominance hierarchies and patterns of agonistic interactions from birds in captivity and from individually marked wild birds. Our results

highlight the similarity and plasticity of social strategies deployed by ravens across contexts. They stress the need to study socio-cognitive skills 'in situ', to fully grasp the diversity of individual responses to the range of challenges faced in their daily life.

What makes a dog a dog? How life experience shapes the behaviour of dogs (*Canis familiaris*) living in different environments

Giulia Cimarelli, Martina Lazzaroni, Gwen Wirobski, Friederike Range, Sarah Marshall-Pescini

Since the start of domestication over 15.000 years ago, dogs have associated more or less closely with humans. Nowadays dogs' living environments can range from urban households, where humans are sometimes their only social partners, to villages or even forested areas, where they may form packs and rarely see humans. How do these different lifestyles affect dogs' behaviour? While early canine research focused on testing easily accessible pet dogs, recent work has started investigating potential differences between dogs living in different environments. Our group is now comparing dogs living as pets in Vienna, dogs living in packs but hand-raised by humans (Wolf Science Center dogs), and free-ranging dogs living on the streets of Morocco. Results show that while some basic behaviours (e.g., persistence) seem to be consistent across populations, performance in socio-cognitive tasks involving humans appears to vary depending on dogs' upbringing. What makes a dog a dog, and what varies across different populations is slowly being revealed.

Social factors modulate children's (*Homo sapiens*) resource control abilities in natural peer groups

Lisa Horn, Yalda Khoshbakht, Thomas Bugnyar

Stable social relationships within groups require a balance between acquiring and controlling resources and maintaining valuable relationships. It is yet unclear, how young children achieve this balance in natural peer groups and which social factors (e.g., age, gender, friendship, social status) modulate their resource control strategies. Here we used a two-level approach to investigate resource control abilities in the day-care context in three groups of children aged 2–6 years (total N=63). During ten sessions of unstructured playtime we observed all naturally occurring resource conflicts, identity of winners and losers, as well as reconciliation behaviour. With two of the groups (N=24 children) we additionally conducted an experiment that simulated a situation of scramble competition (i.e., competing for preferential access to a non-monopolizable resource). We found that age had a positive effect on resource control abilities in both situations, whereas the impact of other factors like friendship and social status depended on the context.

Common marmosets (*Callithrix jacchus*) learn socially via video demonstrations under captive and natural conditions

Vedrana Šlipogor, Nicola Schiel, Antonio Souto, Thomas Bugnyar

Social learning bears particular importance for gregarious species, as receiving information about the environment from others can be a crucial determinant of fitness. Mechanistic aspects of social learning have been studied in a variety of species in captivity, but less work has been done in well-controlled field experiments, under natural conditions. We tested common marmosets, highly social neotropical primates, in both the laboratory setting in Austria, as well as in the semi-arid forests of Northeast Brazil. In both contexts, we provided video demonstrations of unfamiliar conspecifics solving a novel foraging task (opening an artificial fruit in one of two ways), before offering the task to observers themselves. Overall, the monkeys learned from the virtual demonstrators, irrespective of the lab or field setting. However, we found pronounced individual differences in how good and fast individuals acquired social information. We discuss whether this variation in cognitive performance can be explained by consistent inter-individual differences in coping with challenges.

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