considerably between species for any given body size. Numerous hypotheses have been put forward to explain this variation. In recent years, we have tested predictions that flow from a framework focusing on the energetic aspects of having a large amount of the metabolically expensive brain tissue. In this talk, I will give an overview of our findings from broad comparative phylogenetic studies in mammals, and their implications for our understanding of non-human and human primate evolution. In sum, we found evidence for two pathways to increase relative brain size compared to the ancestral state. First, a species may change its lifestyle to allow for a stable increase in its total energy budget, e.g. by changing its diet. Alternatively, or in combination with the first pathway, a species may allocate more energy to the brain and less to other expensive functions such as offspring production. Ultimately, this option results in very low population growth rates even in good conditions, as found in great apes. A further increase in brain size would not be compatible with demographically viable populations in these large-brained primates. However, using comparative evidence from mammals, we demonstrate that help from non-mothers can alleviate this trade-off between reproductive effort and brain size. Nevertheless, the energetic constraints on brain size evolution will only be overcome in species that can actually benefit from enhanced cognitive abilities. While such benefits are potentially ubiquitous, we would expect them to be undermined by unavoidable mortality in some socioecological conditions, and by the difficulty of transferring knowledge across generations in some social systems. A combined test of all these considerations remains a challenge, largely due to the shortcomings of the distinct datasets, but I will present the newest data and results from our current projects.

Do Wild Chimpanzees Have Functionally Referential Food Calls?

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Key Words: Food calls · Functionally referential · *Pan troglodytes* · Vocal communication

Vocal research on non-human primates has revealed little flexibility in production and usage, as well as limited referential capabilities. We investigated the variation present in chimpanzee food calls, a graded yet context-specific vocalization. Our aim was to elucidate to what extent these calls are referential in the wild since evidence for functional reference has been recently supported in captivity. Additionally, we investigated whether nearby conspecifics could potentially use any differences in food call structure to guide their foraging effort, as has been proposed in the 'information sharing hypothesis' for the function of food calls. We recorded and analysed food calls of chimpanzees from one habituated group living in Taï National Park. Vocalizations were recorded during continuous focal follows conducted over an 11-month field season, with measurements of tree species, size and fruit amount noted for every feeding event. We use robust mixed model analyses to investigate whether the acoustic structure of chimpanzee food calls are specific to food type and quantity. Preliminary results suggest that signallers may indeed be producing calls more specifically, with regards to fruit species and amount, than has been previously shown in the wild. We address the various motivational and cognitive factors that may contribute to the patterns observed in food call production. Furthermore, we are analysing responses of nearby individuals to these food calls, namely if others arrive. On-going analysis suggests food calls may also elicit specific responses. We discuss our results in the light of different theories proposed for the evolution of language in general, and more specifically concerning vocal communication systems in non-human primates.