

CS18-023 - The innovation problem: factors influencing innovative tool use in human infants and cockatoos

Abstract

Within this project, we compared the ability of finding solutions to technical problems between children of different ages and Goffin's cockatoos for several years. Goffin's cockatoos are a small but extremely curious and playful island species from Indonesia. They are considered a model species for technical cognition because they can quickly invent solutions to complex problems and even invent the use tools. Unfortunately, due to the pandemic, some of the originally planned experiments on children were not possible during the project's period. Nevertheless, we were able to show that cockatoos create complex combinations between their 'toys' in unrewarded object play, similar to the way that small children play with objects. Thereby they seem to be particularly interested in toy combinations that can potentially end in a construct. A comparison between children and cockatoos on an innovation arena with 20 different small tasks showed that when it comes to simple technical problems that do not require the invention of new tools, children as young as two years old perform at a similar level as the cockatoos. However, this changes drastically when it comes to inventing new tools or tool combinations: In tasks that require the construction of new tools or the coordinated use of several new tools together, the children show a so-called innovation gap in our and previous experiments. The majority of children only solve the respective tasks when they are around eight years old. In the case of cockatoos, in these and previous studies it was usually a third to half of the animals that solved the problems, i.e. typically the level of a six-year-old child. The cockatoos found solutions to tasks requiring multiple tools such as 'using a tool to get another tool that can then be used to get a reward; using and/or making several objects of different functions to achieve the same goal or using a free object to guide another free object to achieve the goal. In the wild, cockatoos build sets of up to three tools, the complexity of which even rivals tools made and used by the great apes. In this project, we also discovered that Goffin's cockatoos learn to differentiate two identical objects based solely on their weight more quickly than capuchin monkeys and chimpanzees. Follow-up experiments will reveal to what extent this is due to differences in methodology. We hope that the results of this project will contribute to improving our assessment of the cognitive abilities of birds, which are often underestimated. We also hope that our results will enable further direct comparisons between birds, primates and humans. Examining the independent development of similar cognitive abilities in distantly related species ultimately leads to a better understanding of the evolution of intelligent behaviour.

Scientific disciplines:

Cognitive science (40%) | Developmental psychology (40%) | Behavioural biology (20%)

Keywords:

tool use; tool manufacture; innovation; problem solving; avian cognition, child development

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Further links to the persons involved and to the project can be found under
<https://www.wwtf.at/jpeto2.brunner.at/funding/programmes/cs/CS18-023/>