

Tools and primates: Opportunity, not necessity, is the mother of invention

November 11 2014



A chimpanzee using a stone to crack a nut. Credit: Kathelijne Koops

Whether you are a human being or an orang-utan, tools can be a big help in getting what you need to survive. However, a review of current research into the use of tools by non-human primates suggests that ecological opportunity, rather than necessity, is the main driver behind primates such as chimpanzees picking up a stone to crack open nuts.

An opinion piece by Dr Kathelijne Koops of the University of Cambridge and others, published today in *Biology Letters*, challenges the assumption that necessity is the mother of invention. She and her colleagues argue that research into [tool](#) use by primates should look at the opportunities for tool use provided by the local environment.

Koops and colleagues reviewed studies on tool use among the three habitual tool-using primates - [chimpanzees](#), orangutans and bearded capuchins.

Chimpanzees use a variety of tools in a range of contexts, including stones to crack open nuts, and sticks to harvest aggressive army ants. Orang-utans also use stick tools to prey on insects, as well as to extract seeds from fruits. Bearded capuchin monkeys living in savannah like environments also use a variety of tools, including stones to crack open nuts and sticks to dig for tubers.

The researchers' review of the published literature, including their own studies, revealed that, against expectations, tool use did not increase in times when food was scarce. Instead, tool use appears to be determined by ecological opportunity - with calorie-rich but hard-to-reach foodstuffs appearing to act as an incentive for an ingenious use of materials.

"By ecological opportunity, we mean the likelihood of encountering tool materials and resources whose exploitation requires the use of tools. We showed that these ecological opportunities influence the occurrence of tool use. The resources extracted using tools, such as nuts and honey, are among the richest in primate habitats. Hence, extraction pays off, and not just during times of food scarcity," said Koops.

Tool use - and transmission of tool-making and tool-using skills between individuals - is seen as an important marker in the development of culture. "Given our close genetic links to our primate cousins, their tool

use may provide valuable insights into how humans developed their extraordinary material culture and technology," said Koops.

It has been argued that culture is present among wild primates because simple ecological and genetic differences alone cannot account for the variation of behaviour - such as tool use - observed across populations of the same species.

Koops and co-researchers argue that this 'method of exclusion' may present a misleading picture when applied to the material aspects of culture.

"The local environment may exert a powerful influence on culture and may, in fact, be critical for understanding the occurrence and distribution of material culture. In forests with plenty of nut trees, we are more likely to find chimpanzees cracking [nuts](#), which is the textbook example of chimpanzee material culture," said Koops.

"Our study suggests that published research on primate cultures, which depend on the 'method of exclusion', may well underestimate the cultural repertoires of primates in the wild, perhaps by a wide margin. We propose a model in which the environment is explicitly recognised as a possible influence on material culture."

More information: Opinion Piece - The Ecology of Primate Material Culture, *Biology Letters*: [rsbl.royalsocietypublishing.org ...
.1098/rsbl.2014.0508](https://royalsocietypublishing.org/doi/10.1098/rsbl.2014.0508)

Provided by University of Cambridge

Citation: Tools and primates: Opportunity, not necessity, is the mother of invention (2014,

November 11) retrieved 4 April 2024 from <https://phys.org/news/2014-11-tools-primates-opportunity-necessity-mother.html>

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