Crows 'reverse engineer' tools from memory: study

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'Put simply, crows can reverse engineer tool designs using only a mental image of that tool'

New Caledonian crows use mental pictures to twist twigs into hooks and

make other tools, according to a provocative study that suggests the notoriously clever birds pass on successful designs to future generations, a hallmark of culture.

"We find evidence for a specific type of emulation we call mental template matching," co-author Alex Taylor, director of the Language, Cognition and Culture Lab at the University of Aukland, told AFP.

"Put simply, crows can reverse engineer tool designs using only a mental image of that tool."

A long-simmering debate among evolutionary biologists asks how much of the crow's tool-making ability is genetically programmed, and how much is acquired and transmitted through learning and memory.

A famous experiment filmed in 2002 featuring "Betty the crow" showed the bird bending a straight piece of wire into a hook in order to retrieve a morsel of meat stuffed in a narrow plastic tube.

The feat was hailed as proof that the New Caledonian crow could invent new tools on the spot, a rare ability among non-human animals.

But a study published a dozen years later found that more than a dozen wild-caught crows also broke off small branches and fashioned them into tiny hooks with their beaks, leading some researchers to conclude this ability is at least partly hardwired.

To the extent it is learnt, there's a further split: some experts think the birds are mimicking witnessed techniques, and others—including Taylor—say the crows have a more sophisticated approach.

The distinction is comparable to two methods for making a paper plane.

"You can follow a list of directions—fold in the middle, then the corners, etc.", said Taylor.

Culturally transmitted

"Or you could have an image in your mind of what you want the airplane to look like at the end, and work to that goal."

To remove lingering ambiguity, Taylor and colleagues captured eight wild crows and trained them to drop variously sized bits of paper into a vending machine in order to retrieve rewards.

In the second part of the experiment, the birds—when given large cards—tore them up to create pieces similar in size and shape to those that had earned them goodies.

"The crows were able to recreate tool designs without a reference point—there was no tool they could see when making a 'tool' from the card," Taylor said.

The only way the birds could have reproduced the objects is by having a "mental template of the tool design in their mind."

Indeed, New Caledonian crows do not appear to imitate, or play close attention to the tool building of other birds in the wild.

But that does not mean that the tools they design cannot be culturally transmitted, Taylor insisted.

"Cumulative cultural evolution is the natural selection of ideas—we copy the best ideas and then modify them," he explained.

"Some of these modifications works, some don't, and the best ones are

then copied and passed on."