

# These Birds Can Think, Plan and Innovate

A recent study reveals the extraordinary cognitive abilities of Goffin's cockatoos, including tools used that could change the way we think about intelligence in the animal world.

**Analysis by Dr. Karen Shaw Becker**

## STORY AT-A-GLANCE

- Goffin's cockatoos, a type of small, white parrot, use two or more different tools to achieve a goal, a practice known as associative tool use
- Chimpanzees in the northern Congo are the only other non-human species known to do this, while "fishing" for termites
- For the study, the birds needed to punch through a paper membrane with a pointy stick and then fish out a nut with a plastic straw
- Seven out of 10 cockatoos tested taught themselves how to use the tools to get the cashews, and two of them did so in just 35 seconds
- Even when the boxes were placed in hard-to-reach places that required the cockatoos to carry two tools to a new location, they succeeded; some of the birds carried both tools at once, while others carried only the tool they needed
- The findings confirm that Goffin's cockatoos not only use the tool set but also can apply it flexibly as needed

Goffin's cockatoos, a type of small, white parrot, have joined the very select group of wild creatures known to use two or more different tools to achieve a goal, a practice known as associative tool use. Chimpanzees in the northern Congo are the only other non-human species known to do this. In 1995, a group of chimpanzees was observed using a two-step process to "fish" for termites.<sup>1</sup>

First, the chimps use a blunt stick to poke holes in the termite mound. Next, they use a flexible tool to remove the termites from the holes. This prompted a study in cockatoos, which not only used multiple tools to "fish" for cashews, but also were aware of their own tool usage.

"With this experiment we can say that, like chimpanzees, Goffin's cockatoos not only appear to be using toolsets, but they know that they are using toolsets," evolutionary biologist Antonio Osuna-Mascaró, with the University of Veterinary Medicine Vienna, said in a news release. "Their flexibility of behavior is stunning."<sup>2</sup>

## Goffin's Cockatoos Use Tool Set to Get Nuts

Previous studies on Goffin's cockatoos hinted at their high intelligence. They're known, for instance, to innovate solutions when necessary, including tool usage. The birds figured out how to get to the seed of a fruit using a set of three wooden tools, each with its own function — one for wedging, one for cutting and one for spooning.

It wasn't known, however, whether the birds considered the tools a set or simply were using them as a chain of single uses. To find out, the birds were tasked with getting to cashews set behind a clear paper. To get to the nut, the birds needed to punch through the paper with a pointy stick and then fish out the nut with a plastic straw.

Seven out of 10 cockatoos tested taught themselves how to use the tools to get the cashews, and two of them did so in just 35 seconds. The researchers were then interested in whether the birds would choose the appropriate tool or tool set if presented with different tasks, including getting to the cashew with a paper membrane in the way and one task without the membrane.

"The cockatoos had to act according to the problem; sometimes the toolset was needed, and sometimes only one tool was enough," Osuna-Mascaró explained.<sup>3</sup>

All of the birds figured out when they needed only one tool and which tool they needed. They also engaged in an unusual behavior to help figure it out. "When making the choice between which tool to use first, they were picking one up, releasing it, then picking up the other one, releasing it, returning to the first one, and so on," Osuna-Mascaró said.<sup>4</sup>

Even when the boxes were placed in hard-to-reach places that required the cockatoos to carry two tools to a new location, they succeeded. Some of the birds carried both tools at once, while others carried only the tool they needed. The findings confirm that Goffin's cockatoos not only use the tool set but also can apply it flexibly as needed:<sup>5</sup>

*"Our third experiment suggests that the tool set is more than just the use of tools in sequence (as historically suggested for chimpanzees before the flexibility of their tool set transport was observed) ... four Goffins were observed to transport two tools simultaneously, and two Goffin's were able to not only transport their tool set together but even showed some flexibility depending on the task requirements. This suggests that, like in chimpanzees, two tools may be categorized as a tool set."*

## Goffin's Cockatoos Also Play Golf

Goffin's cockatoos, which live in the Molucca region of Indonesia, are emerging as some of the smartest birds on the planet — even among parrots, which are known for their intelligence.

It's not entirely surprising. Researchers at Ruhr-University Bochum in Germany previously uncovered that a previously undetected brain structure in birds may act similarly to the cerebral cortex, explaining the longstanding mystery of how birds achieve such incredible cognitive feats.<sup>6</sup>

Similar to the cashew study, Goffin's have previously shown their aptitude for the game of golf by popping a tiny ball through a hole in a closed box, then using a stick to maneuver the ball to one side of the box to trigger a trapdoor that released a cashew.<sup>7</sup> The birds in the study, which included some of the same cockatoos in the cashew trials, each used their own unique approach to complete the task.

"One of the most amazing aspects of the process was to observe how these animals each invented their own individual technique in how to grip the stick and hit the ball, sometimes with astonishing dexterity," Osuna-Mascaró, who was involved with both studies, told Science Focus magazine.<sup>8</sup>

"One of the birds operated the stick while holding it between the mandibles, one between the beak tip and tongue and one with his claw, similar to a primate." The team intends to continue their studies further to explore the realm of cockatoo cognition:<sup>9</sup>

*"Our results also open the door to future studies in which we will explore their ability to plan actions over a longer period of time but investigate possible anticipation through end-state comfort effect and explore switching behavior as a possible tool to study metacognition."*

## Sources and References

<sup>1,9</sup> [Current Biology February 10, 2023](#)

<sup>2,3,4</sup> [Science Daily February 10, 2023](#)

<sup>5</sup> [Current Biology February 10, 2023, Discussion](#)

<sup>6</sup> [Science Magazine September 24, 2020](#)

<sup>7</sup> [Scientific Reports, Volume 12, Article number: 1510 \(2022\)](#)

<sup>8</sup> [Science Focus, February 9, 2022](#)

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