

### **Bird-brains smarter than your average ape**

Scientists are studying whether animals look at the physical world in the same way as humans, and have discovered some birds are better at physical reasoning than apes.

Much of the apparently sophisticated animal behaviour we see in the wild is actually based on simple associations. New Caledonian crows are famous for their complex tool manufacturing abilities. What kind of cognition are these tool abilities based on? Intriguing results last year tentatively suggested that New Caledonian crows used analogical reasoning, rather than associative learning, to solve a metatool problem. In a paper appearing online this week in *Proceedings of the Royal Society London B*, scientists at The University of Auckland present the most conclusive proof to date that the crows' tool skills are based on the ability to reason analogically.

In the study, New Caledonian crows were presented with a trap-tube puzzle. In this task the crows had to extract food from a horizontal tube in a direction that avoids a trap. When the crows were presented with variations of the problem where arbitrary cues were removed, the crows continued to solve the problem. This suggested the crows had not simply associatively learnt to pull away from these arbitrary cues. The scientist then presented the crows with a trap-tube with two holes. One hole was bottomless, allowing food to fall through it and out of the trap. The other hole had a base and so trapped food that was pulled into it. The crows failed to consistently solve this problem and appeared reluctant to pull the food into either hole. This suggested the crows were using the position of the hole to guide their actions.

Finally, the crows were presented with a trap-table puzzle. In this problem an animal has to choose between pulling food across a wooden table or pulling food into a hole set in the table. In a recent study 20 individuals from the great ape species were unable to transfer their knowledge from the trap-table and trap-tube or vice versa, despite the fact that both these puzzles work in the same way. Strikingly the crows in The University of Auckland study were able to solve the trap-table problem after their experience with the trap-tube. By solving the trap-table the crows demonstrated that they had not just learnt to pull away from the specific hole in the Perspex trap-tube, but could generalise what they understood to a novel problem.

"The crows appeared to solve these complex problems by identifying causal regularities," says Professor Russell Gray of the Department of Psychology. "The crows' success with the trap-table suggests that the crows were transferring their causal understanding to this novel problem by analogical reasoning. However, the crows didn't understand the difference between a hole with a bottom and one without. This suggests the level of cognition here is intermediate between human-like reasoning and associative learning."

"It was very surprising to see the crows solve the trap-table," says PhD student Alex Taylor. "The trap table puzzle was visually different from the trap-tube in its colour, shape and material. Transfer between these two distinct problems is not predicted by theories of associative learning and is something not even the great apes have so far been able to do".

Taylor, A.H., Hunt, G.R., Medina, F.S. and Gray, R.D. (2008). Do New Caledonian crows solve physical problems through causal reasoning? *Proceedings of the Royal Society, London B*. Published online 17/9/2008, doi:10.1098/rspb.2008.1107.

Find the paper at the Royal Society FirstCite link below:  
<http://journals.royalsociety.org/content/17121r228k420u59/>

This research was funded by a Royal Society of New Zealand Marsden Grant to Dr Gavin Hunt and Professor Russell Gray entitled, *"The evolution of complex cognition: generalists or specialists"*.

Wild New Caledonian tool use explained by Russell Gray  
<http://www.youtube.com/watch?v=QNaZ3EoWnZg>

Metatool use explained by Russell Gray  
<http://www.youtube.com/watch?v=nIwsNvCkhrk&feature=related>

The trap-tube and trap-table experiment explained by Alex Taylor  
<http://www.youtube.com/watch?v=M52ZVtmPE9g>

## Contact

Emma Timewell, Communications Adviser  
Ph: 09 373 7599 ext 83258 or 021 97 00 89  
Email: [e.timewell@auckland.ac.nz](mailto:e.timewell@auckland.ac.nz)

Professor Russell Gray  
Ph: 09 373 7599 ext 88525  
Email: [rd.gray@auckland.ac.nz](mailto:rd.gray@auckland.ac.nz)

Alex Taylor  
Ph: 09 373 7599 ext 85969  
Email: [alexhtaylor@gmail.com](mailto:alexhtaylor@gmail.com)

**Images** (available from [e.timewell@auckland.ac.nz](mailto:e.timewell@auckland.ac.nz))



*Copyright: Gavin Hunt*

