# Like monkeys, pigeons can put numbers in order

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Pigeon participating in Dr Scarf's research. Photo by William van der Vliet

(PhysOrg.com) -- Pigeons are on par with primates in their numerical abilities, according to new University of Otago research appearing in the leading international journal *Science*.

The Department of Psychology researchers showed that pigeons can compare pairs of images picturing up to nine objects and order them by the lower to higher number with a success rate above chance.

Study lead author Dr Damian Scarf says that up until now, only humans and primates were thought to share the ability to use abstract numerical rules in this way.

“Our research not only shows that pigeons are also members of this exclusive club, but, somewhat surprisingly, their performance is on a par with that of monkeys.”

The researchers initially trained the pigeons by presenting them with 35 sets of three images, each with one, two, or three objects of different sizes, colours and shapes.

They were rewarded with wheat when they pecked the images in the correct ascending sequence.

Next, the researchers sought to test if the pigeons could take what they had learnt from ordering the three images and apply it to images with higher numbers of objects than they had seen before. The pigeons were presented with pairs of images with between one and nine objects and tested on their ability to respond to them in ascending order.

As well as performing above chance in these tests, the pigeons also demonstrated a ‘distance effect’ comparable to that found in landmark US research in 1998 involving rhesus monkeys performing similar tasks. The greater the distance between the numbers in the pairs, the faster and more accurate the pigeons were, Dr Scarf says.

“While this is obviously a long way away from how humans can count, it shows that an animal with a brain structured quite differently to ours is still able to perform complex mental tasks of which only humans were once thought capable. Our findings add to a growing body of evidence that pigeons are among a number of avian species exhibiting impressive mental abilities that really do give the lie to the old ‘bird brain’ insult,” he

says.

The next phase of Dr Scarf's pigeon research includes investigating the neural underpinnings of their numerical abilities by recording their brain cell activity when they undertake numerical tasks.

He also plans to test kea, which have been claimed to have some of the intelligence of a six-year-old child. He is currently setting up a project that will utilise the two keas and other parrot species housed at the Dunedin Botanic Garden aviary.

**More information:** "Pigeons on par with primates in numerical competence," by Damian Scarf, Harlene Hayne, Michael Colombo. 23 December 2011, Vol 334, *Science* DOI: 10.1126/science.1213357

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