FirstRand

Pigeons and AI

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When machine learning and artificial intelligence have crept into our dinner talk, it's fair to say they have entered the mainstream of our lives to the point of no return.

The next time someone uses "bird brain" as an insult, you'd do well to point out that some species of birds have capabilities comparable to AI tools – even the common pigeon.

Pigeons are known for their incredible navigational abilities and homing instincts. They have long memories and a gift for recognising visual patterns, but a recent study has revealed something even more surprising about these birds. According to researchers, a pigeon's brain can match wits with artificial intelligence because they both employ the same process called associative learning. This discovery opens up possibilities for researchers studying animal cognition and artificial intelligence.

Associative learning is a type of learning where an organism learns to associate one stimulus with another. For example, a pigeon might learn to associate a particular sound with food. If the sound is played, the pigeon will come to expect food and will start looking for it. Similarly, an artificial intelligence system might learn to associate a particular set of inputs with a specific output. For example, an AI system might learn to recognise images of cats based on certain visual cues.
The researchers behind the recent study wanted to see if pigeons and AI systems used the same neural mechanisms to perform associative learning. They trained pigeons to recognise visual patterns and then tested their ability to recognise novel patterns.

While working on a different study, Ed Wasserman, Stuit Professor of Experimental Psychology in the Department of Psychological and Brain Sciences at Iowa and the study's corresponding author, noticed distinct differences in how pigeons approached a problem compared to human subjects.

Wasserman studied how both birds and people gazed at visual patterns and guessed how the researchers categorised them. Each pattern featured black stripes of varying widths and angles against a white background. The challenge in the study comes from how the patterns were grouped. Instead of separating them by simple logical rules, the researchers sliced them into more arbitrary categories.

Source: University of Iowa

They also trained an AI system to recognise the same patterns and tested its ability to recognise novel patterns. The results were surprising: the pigeons and AI system performed equally well on the task.

"That poses a special problem for both pigeons and people: You can't just look at the orientation of the lines, you can't just look at the width of the lines — somehow you have to combine that information," Wasserman explains.
Human participants wanted to decipher the mysterious rules that confined the patterns to their respective groups. But the birds didn't seem to try that strategy at all.

"Pigeons never showed any tendency to carve the stimuli in terms of the orientation alone or in terms of the width of the lines alone," Wasserman says. "[But] people did."

"You hear all the time about the wonders of AI, all the amazing things that it can do," Wasserman told Inverse. "It can beat the pants off people playing chess, or at any video game, for that matter. It can beat us at all kinds of things. How does it do it? Is it smart? No, it's using the same system or an equivalent system to what the pigeon is using here."

This finding is significant for a few reasons. First, it suggests that the way animals and AI systems learn might be more similar than previously thought. This could help researchers develop better AI systems by taking inspiration from biological systems. For example, researchers might be able to develop AI systems that are better at recognising visual patterns by studying how the pigeon's brain processes visual information.

Second, the finding has implications for our understanding of animal cognition. Pigeons are often seen as relatively simple animals, but this research suggests that their brains are capable of sophisticated forms of learning. This could help us better understand how other animals learn and process information.

Finally, the research highlights the importance of interdisciplinary research. By bringing together researchers from different fields, such as neuroscience and computer science, we can gain new insights into how the brain works and how we might be able to create better artificial intelligence systems.

Of course, there are also limitations to this research. For example, the study only looked at one type of learning and one type of animal. It's possible that other types of learning or other animals might not perform as well as pigeons and AI systems on this particular task. Additionally, it's important to note that just because the pigeons and AI system performed equally well on this task doesn't necessarily mean that they use exactly the same neural mechanisms to learn.

Numerous animal species use associative learning, but only a select few – dolphins and chimpanzees among them – are thought to be capable of declarative learning.

While there are limitations to the research, it opens up exciting new possibilities for researchers studying animal cognition and artificial intelligence.