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Birds with grammar skills

Recognising abstract grammar structures was believed to be a typically human skill. Michelle Spierings discovered that a parakeet species has this ability too. Zebra finches, however, use a different strategy to categorise sounds.

By Nienke Beintema

Humans are able to discern general grammar patterns. This allows them to make an infinite number of language constructions by applying a limited set of general rules. It is a

complex skill that seems to be unique to human language learning. But does this skill evolve in humans only, setting us apart from other animals, or did it evolve much earlier? If so, researchers should be able to find it in other animal groups as well.

To investigate this, Michelle Spierings studied two bird species: the zebra finch, which learns only one song early in life, and the budgerigar, a parakeet. Parakeets make much more complex sounds, and can learn new sounds throughout their lives.

‘We designed an experiment to test both species’ grammar abilities,’ says Spierings. ‘We placed them in a room with two buttons. Birds are curious and tend to press buttons with lights in them. If they pressed the first button, they would hear a three-syllable song made up of two different sounds. For instance XXY, or YXX. If they pressed the second button after first hearing XXY, they would get a treat. If they pressed the second button after hearing YXX, however, the light would go out, which they find unpleasant. So we were conditioning them. Both species were able to learn the rule.’

However, when she then tested whether the birds could apply the rule to the exact same structures, composed of new sounds (such as AAB versus ABA), she observed a striking difference. Budgerigars can apply the grammar rule to new sounds. Zebra finches, however, cannot. They had mastered the trick in the learning phase by memorising the position of the sound, for instance: ‘Y at the end’. While they would not react to AAB, they would to ABY. Although impressive, memory is not a complex cognitive skill.

‘Budgerigars are now the only animal species known to have grammar abilities,’ says Spierings. ‘I think that is really exciting. Apparently we are not so unique after all.’



MICHELLE SPIERINGS (1987) studied biology in Leiden and neuroscience and cognition in Utrecht and Cambridge. Following her PhD in Leiden (2016), she moved to Vienna for a postdoc position.