

How birds, mammals and children learn sounds

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A special issue of the *Philosophical transactions of the Royal Society B* on “Vocal learning in animals and humans” covers research in the field of vocal learning across a range of species including humans, dolphins, seals, elephants, bats and

birds. Credit: Sonja Vernes

Some songbirds learn to sing by listening to other birds. Some other animals can learn to copy sounds. But what does that tell us about human speech? Sonja Vernes from the Max Planck Institute for Psycholinguistics in Nijmegen is lead editor of a special issue of the *Philosophical Transactions of the Royal Society B* on vocal learning in animals and humans, bringing together research on animals ranging from seals and bats to birds and humans.

Alex the grey parrot, who famously asked "what color?" when looking in the mirror, had astonishing abilities to mimic [human speech](#). Interest in the ability of [animals](#) to learn sounds dates back thousands of years. Research on this ability, known as vocal learning, can shed light on the evolution of communication and human speech and language. According to MPI's Sonja Vernes, "comparative work investigating this trait across different types of animals is particularly important."

Few animals can learn sounds. Apart from birds, only dolphins and whales, seals, elephants, and bats were thought to be capable of vocal learning. For instance, dolphins have signature calls that may help them recognize each other. Hoover, the famous talking seal, has been observed to bark in a thick New England accent from his aquarium ("get over here"). Among animals with this trait, the type and role of learning varies greatly. In birds, we see that zebra finches learn to precisely copy their father's song, while parrots can learn the sounds of different species, including human speech. "The diversity of these animals and the complexity of [vocal learning](#) presents particular challenges to the field, but also provides clear opportunities," says Vernes.

In a framework paper that leads the special issue, senior investigators

Sonja Vernes and Vincent Janik from the University of St Andrews discuss the role of learning and experience in the sound repertoire of animals. The researchers propose a novel classification system, taking into account how accurately sounds are copied and the time it takes to learn them. Timing is important, as animals differ in when and how quickly they learn. For example, parrots can quickly mimic many different sounds throughout their life, while [zebra finches](#) can only learn a restricted range of sounds while they are young—and with lots of practice.



A group of pale spear nosed bats, characteristically huddled together in social groups. Credit: I. Alvarez van Tussenbroek. Credit: I. Alvarez van Tussenbroek

MPI lead author Ella Lattenkamp and her colleagues present experimental findings on the spear-nosed bat. The researchers studied the calls of three [young animals](#) that were unable to hear the calls of other bats, and compared them to the calls of normally hearing bats of the same age. The bats that could not hear had atypical vocalizations, which shows that bats need to hear the sounds of others to learn their normal calls—something that is also true for humans when they learn to speak.



Pale spear nosed bats enjoy the dark, and close social contact. Credit: I. Alvarez van Tussenbroek. Credit: I. Alvarez van Tussenbroek

Taken together, the 21 contributions to the special issue illustrate that the age-old fascination for animal vocalizations has grown into a fruitful research tradition, shedding light on fundamental questions about the development of animal communication and human [speech](#) and language.

More information: Vernes SC, Janik VM, Fitch WT, Slater PJB. 2021 Vocal learning in animals and humans. *Phil. Trans. R. Soc. B*, 376: 20200234. doi.org/10.1098/rstb.2020.0234

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