

Building blocks of bird babble identified

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The chestnut-crowned babbler (*Pomatostomus ruficeps*) examined in the study, that lives in the Australian outback, is a highly social bird. Credit: Niall Stopford

A new study by an international team headed by the University of Zurich sheds light on whether animal vocalizations, like human words, are constructed from smaller building blocks. By analyzing calls of the Australian chestnut-crowned babbler, the researchers have for the first time identified the meaning-generating building blocks of a non-human communication system.

Stringing together meaningless sounds to create meaningful signals is a core feature of human language. Investigating whether animals share this basic combinatorial ability has been complicated by difficulties in identifying whether animal vocalizations are made from smaller, meaningless sounds, or building blocks. New research by scientists at the Universities of Zurich, Exeter, Warwick, Macquarie and New South Wales has addressed this question in the calls of the chestnut-crowned babbler (*Pomatostomus ruficeps*)—a highly social bird from the Australian Outback.

Meaningful calls composed of distinct sounds

Previous research demonstrated that chestnut-crowned babbler calls seemed to be composed of two different sounds "A" and "B" in different arrangements when performing specific behaviors. When flying, the birds produced a flight call "AB," but when feeding chicks in the nest they emitted "BAB" provisioning calls. In the current study, the authors used playback experiments, previously used to test speech-sound discrimination in human infants, to probe the perception of the sound elements in babblers. "Through systematic comparisons we tested which of the elements babblers perceived as equivalent or [different sounds](#). In doing so, we were able to confirm that the calls could be broken up into two perceptually distinct sounds that are shared across the calls in different arrangements," explains Sabrina Engesser from the University of Zurich, lead author on the study. "Furthermore, none of the comprising elements carried the meaning of the calls, confirming the elements are meaningless," she adds.

"This system is reminiscent of the way humans use sounds to form meaningful words," says co-author Andy Russell from the University of Exeter. The research findings, which are published in the journal *Proceedings of the National Academy of Sciences*, reveal a potential early step in the emergence of the elaborate combinatorial sound system

characterizing human language.

Understanding the evolution of communication

Last author Simon Townsend from the University of Zurich and the University of Warwick says: "This is the first time that the meaning-generating building blocks of a non-human communication system have been experimentally identified." He concludes: "Although the building blocks in the babbler system may be of a very simple kind, it might still help us understand how combinatoriality initially evolved in humans."

These findings raise the exciting possibility that the capacity to generate meaning from meaningless building blocks is widespread in [animals](#). However, the authors caution that there are still considerable differences between such systems and word generation in language. They emphasize that a focus on the acoustic distinctiveness of sounds in meaningful animal vocalizations offers a promising approach to investigate the [building](#) blocks of non-human animal communication systems.

More information: Sabrina Engesser et al., "Chestnut-crowned babbler calls are composed of meaningless shared building blocks," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1819513116

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