Key element of human language discovered in bird babble

June 29 2015

Chestnut-crowned babbler. Credit: Jodie Crane

Stringing together meaningless sounds to create meaningful signals was

previously thought to be the preserve of humans alone, but a new study has revealed that babbler birds are also able to communicate in this way.

Researchers at the Universities of Exeter and Zurich discovered that the chestnut-crowned babbler - a highly social bird found in the Australian Outback - has the ability to convey new meaning by rearranging the meaningless sounds in its calls. This babbler bird communication is reminiscent of the way humans form meaningful words. The research findings, which are published in the journal *PLOS Biology*, reveal a potential early step in the emergence of the elaborate language systems we use today.

Lead author Sabrina Engesser from the University of Zurich said: "Although previous studies indicate that animals, particularly birds, are capable of stringing different sounds together as part of a complex song, these songs generally lack a specific meaning and changing the arrangement of sounds within a song does not seem to alter its overall message."

"In contrast to most songbirds, chestnut-crowned babblers do not sing. Instead its extensive vocal repertoire is characterised by discrete calls made up of smaller acoustically distinct individual sounds." she added.

"We think that babbler birds may choose to rearrange sounds to code new meaning because doing so through combining two existing sounds is quicker than evolving a new sound altogether." said co-author Professor Andy Russell from the University of Exeter who has been studying the babblers since 2004.

The researchers noticed that chestnut-crowned babblers reused two sounds "A" and "B" in different arrangements when performing specific behaviours. When flying, the birds produced a flight call "AB", but when feeding chicks in the nest they emitted "BAB" prompt calls.

When the researchers played the sounds back, the listening birds showed they were capable of discriminating between the different call types by looking at the nests when they heard a feeding prompt call and by looking out for incoming birds when they heard a flight call. This was also the case when the researchers switched elements between the two calls: making flight calls from prompt elements and prompt calls from flight elements, indicating that the two calls were indeed generated from rearrangements of the same sounds.

Co-author Dr Simon Townsend from the University of Zurich said: "This is the first time that the capacity to generate new meaning from rearranging meaningless elements has been shown to exist outside of humans.

"Although the two babbler bird calls are structurally very similar, they are produced in totally different behavioural contexts and listening birds are capable of picking up on this."

The authors report that in the chestnut-crowned babbler, the first sound element "B" is what seems to differentiate the meaning between flight and prompt vocalisations, akin to cat and at in English, where the c represents the meaning differentiating element, or phoneme.

"Although this so-called phoneme structuring is of a very simple kind, it might help us understand how the ability to generate new meaning initially evolved in humans" added Dr Simon Townsend. "It could be that when phoneme structuring first got off the ground in our hominid ancestors, this is the form it initially took".

More information: Engesser S, Crane JMS, Savage JL, Russell AF, Townsend SW (2015) Experimental Evidence for Phonemic Contrasts in a Nonhuman Vocal System. *PLoS Biol* 13(6): e1002171. doi:10.1371/journal.pbio.1002171 . www.plosbiology.org/article/in …

journal.pbio.1002171

Provided by University of Exeter