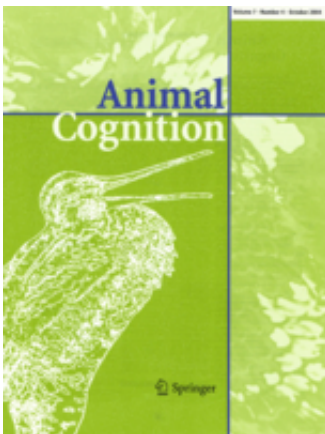


Songbirds turn on and tune up: Bullfinches have the brain power to learn to sing human melodies accurately

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(Phys.org) —Bullfinches learn from human teachers to sing melodies accurately, according to a new study by the late Nicolai Jürgen and researchers from the University of Kaiserslautern in Germany. Their analysis of human melody singing in bullfinches gives insights into the songbirds' brain processes. The work is published online in Springer's journal *Animal Cognition*.

Music performance is considered to be one of the most complex and demanding [cognitive challenges](#) that the human mind can undertake. Melody singing requires precise timing of several organized actions as

well as accurate control of different pitches and durations of consecutive notes.

The songs of free-living bullfinches are soft and contain [syllables](#) that are similar to the whistled notes of human melodies. Teaching birds to imitate human melodies was a popular hobby in the 18th and 19th centuries and the bullfinch was the favorite species.

Using historical data recorded for 15 bullfinches, hand-raised by Jürgen Nicolai between 1967-1975, the researchers studied whether the bullfinches memorized and recalled the note sequence of the melodies in smaller subunits, as humans do, (in chunks or 'modules') or in their entirety, as a linear chain, which is much simpler. The researchers also analyzed the accuracy of the bullfinch's choices and how a bird continues to sing after the human partner pauses. They focused on whether the bird chooses the right note sequence at the right time – so-called alternate singing.

When birds sing solo, they do not retrieve the learned [melody](#) as a coherent unit, but as modules, containing much smaller sub-sequences of 4-12 notes. The researchers investigated the [cognitive processes](#) that allow the bullfinch to continue singing the correct melody part when its human partner stops. They found evidence that as soon as the human starts whistling again, the birds can match the note sequence they hear to the memorized tune in their brain. They anticipate singing the consecutive part of the learned melody and are able to vocalize it at the right time when the human partner stops whistling.

The authors conclude: "Bullfinches can cope with the complex and demanding cognitive challenges of perceiving a human melody in its rhythmic and melodic complexities and learn to sing it accurately."

More information: *Animal Cognition*. [DOI](#)

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