Songbird study shows one-hit wonder must change his tune to attract a mate

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Blue tit. Credit: Ian Hartley

Male birds that are able to precisely repeat song notes stand the best chance of attracting a female mate, according to a new study published in *Nature Communications*.

However, the males need to ensure they have a selection of different songs in their repertoire if they are to hold a female's attention and prevent her from getting bored.

The findings from the study, by scientists from Lancaster University and Manchester Metropolitan University, sheds new light on the evolution of bird song.

Over two years, the researchers recorded and analyzed 7,000 songs of wild blue tits breeding in closely monitored nest boxes near Lancaster University. They devised an experiment that involved playing song recordings to receptive females, and discovered that male vocal consistency—repeating the same pattern of notes with high precision—was the key song feature that made females sexually excited.

But while singing exact copies of the same note was sexy, it also became "boring" for females. Their response gradually declined (habituated) until it was reignited when males switched to a different song type.

The results may explain why birdsong in most species is not hypervariable and constantly changing but shows some moderate variation—balancing the reliable signal of quality against the need to avoid the female habituating and losing interest.

The researchers believe that a male bird's ability to consistently hit the same note in a song is a signal to females, and competitors, that they have strong motor skills, which carry over to other essential qualities in a good mate.

Lead author Dr. Javier Sierro, whose Ph.D. thesis at Lancaster University included this work, said, "In songbirds, singing requires the execution of complex motor patterns within the bird. Precisely hitting those repetitive notes is the way a male bird can demonstrate to potential

mates these qualities, which also cut across social status, reproductive output, longevity, sexual attractiveness and ability to defend territories.

"Many bird species produce trilled songs where the same note is repeated in quick succession. A song may also be repeated during a singing bout. Repetition is needed by the male to perfect his singing skills, however this repetition may carry a cost where the female loses interest over time.

"We found that when males sing different song types, or introduce silent pauses between songs, it reduces female habituation and help retain her interest."

The study also showed that male blue tits with higher vocal consistency had higher reproductive success as measured by the number of eggs in their nest—further adding to the evidence that vocal consistency is a skill found in good quality individuals—those who will contribute genes to future populations. Other song features, such as diversity, were not correlated with clutch size.

Vocal consistency increased over the breeding season and it peaked during the 7 to 10 day period when his female partner was at her most fertile, when she laid an egg daily.

The researchers suggest that a balance between the two crucial aspects of birdsong, consistency and diversity, may resolve a long standing paradox in studies of bird communication, and explain the level of variability in singing styles between species.

Dr. Selvino de Kort, from Manchester Metropolitan University and co-author of the study, said, "Our results explain why most birds repeat song structures and do not sing in a way that advertises song diversity, by continuously producing novel notes or song types."

Dr. Ian Hartley, from the Lancaster Environment Centre at Lancaster University, noted, "Birdsong seems to have evolved under opposing selective effects, which may result in a balance between repetition to achieve the 'sexiest' song, and diversity between songs to reduce the psychological effect of habituation."

The paper's authors are Javier Sierro and Ian Hartley, of Lancaster University, and Selvino de Kort, of Manchester Metropolitan University.

More information: Javier Sierro et al, Sexual selection for both diversity and repetition in birdsong, *Nature Communications* (2023). DOI: 10.1038/s41467-023-39308-5

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