Antiphonal singing in indris

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Indri (*Indri indri*). Credit: Giovanna Bonadonna | University of Turin

"How to get noticed as a singer?" isn't only a concern for young people aspiring to a career in the music industry. Young indris, critically endangered lemurs from Madagascar, sing in antiphony with their choirmates to increase their chances of getting noticed by rival groups, according to a new study in *Frontiers in Neuroscience*.

Indris (*Indri indri*) are one of the few species of primates that sing. They live only in the eastern rainforests of Madagascar, a habitat threatened by illegal logging. They live in small groups, which generally consist of a dominant female and male, their immature offspring, and one or more low-ranking young adults. Both females and males sing, and their songs play an important role in territorial defense and group formation.

In the new study, researchers from Italy, Germany, and Madagascar recorded 496 indri songs and analyzed their timing, rhythm, and pitch. The research is part of a long-term study on the ecology of indris in the vicinity of Andasibe-Mantadia National Park and the Maromizaha Forest, eastern Madagascar.

Group members carefully coordinate their singing, show the researchers. As soon as one indri starts to sing, all group members over two years typically old join in. Indris also tend to copy each other's rhythm, synchronizing their notes.

"The chorus songs of the indri start with roars that probably serve as attention-getter for the other singers and continue with modulated notes of that are often grouped into phrases. In these phrases the indris give a high-frequency note at the beginning, and then the following ones descend gradually in frequency," says Marco Gamba, a Senior Researcher at the Department of Life Sciences and Systems Biology of the University of Turin, Italy [audio/video attached].

Indri (*Indri indri*). Credit: Giovanna Bonadonna, University of Turin

"Synchronized singing produces louder songs, and this may help to defend the group's territory from rival groups. Singing is interpreted as a kind of investment, which may help to provide conspecifics with information on the strength of the pair bond and the presence of potential partners," says doctoral student Giovanna Bonadonna, who is one of the co-authors.

There is one exception to this pattern, however: young, lower-ranking individuals have a strong preference for singing in antiphony rather than synchrony with the rest of the chorus, alternating their notes with those sung by the dominant pair. Gamba and colleagues propose that this is a

tactic that lets low-ranking indris maximize their solitary singing and emphasize their individual contribution to the song.

"Synchronized singing doesn't allow a singer to advertise his or her individuality, so it makes sense that young, low-ranking indris sing in antiphony. This lets them advertise their fighting ability to members of other groups and signal their individuality to potential sexual partners," says Bonadonna.

"Indris are indeed good candidates for further investigations into the evolution of vocal communication. The next steps in our studies will be to understand whether the acoustic structure of the units allows individual recognition and whether genetics plays a role in the singing structure," says Professor Cristina Giacoma from the Department of Life Sciences and Systems Biology, the study's final author.

More information: The indris have got rhythm! Timing and pitch variation of a primate song examined between sexes and age classes, *Frontiers in Neuroscience*, DOI: 10.3389/fnins.2016.00249

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