

What Does the Cowbird Say?

Social Modulation of Song in Brown-headed Cowbirds

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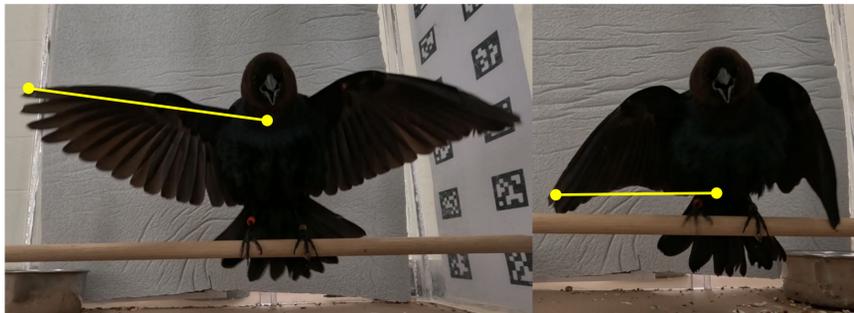
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Introduction

- Brown-headed cowbirds (*Molothrus ater*) naturally form complex systems and thus are a model for studying social behavior¹
- The male cowbird song is a feat of vocal athleticism which may give an “honest signal” of neuromuscular control to females, modulated by social context²

Questions

- Previous research indicates that when males sing to females, their wingspread is smaller than when they sing to other males³



- **Social context and song:** Do male-directed and female-directed songs have subtle acoustic differences which allow us to tell them apart?
- **Prediction:** A larger wingspan leads to songs with higher “song quality” as measured by acoustic precision (a form of “handicap hypothesis”⁴)
 - **Articulation-based song analysis:** Higher song quality = lower note overlap, lower note entropy, lower note frequency

Methodology

- High-quality audiovisual recordings of >250 songs from two male cowbirds over two months
- Recipient sex randomly changed between trials
- Wingspreads and song timing were manually annotated, and song features were extracted

Results

Figure 1. Example song

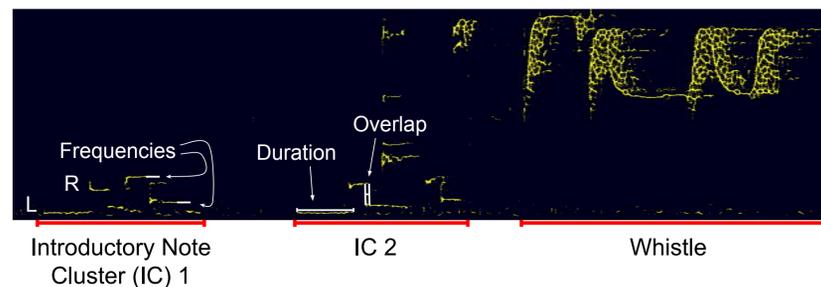


Figure 2. Stereotypy of male-directed and female-directed song spectrograms

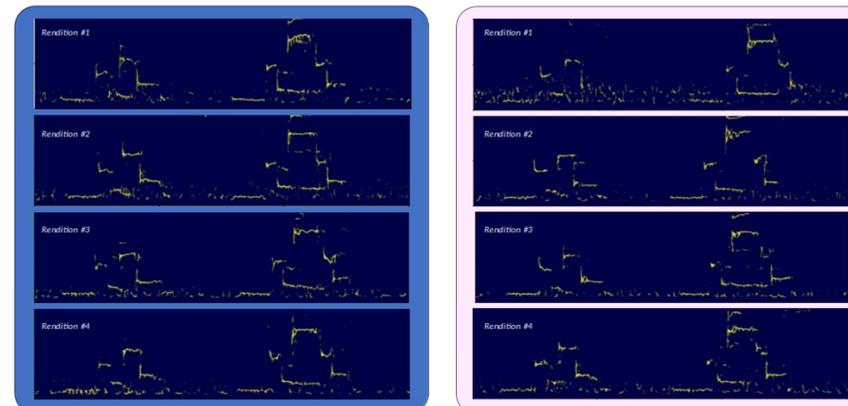
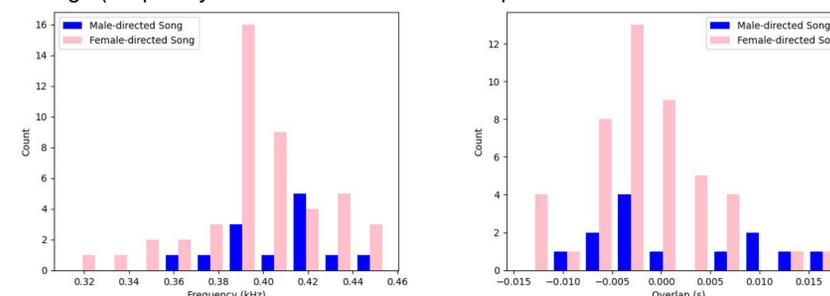
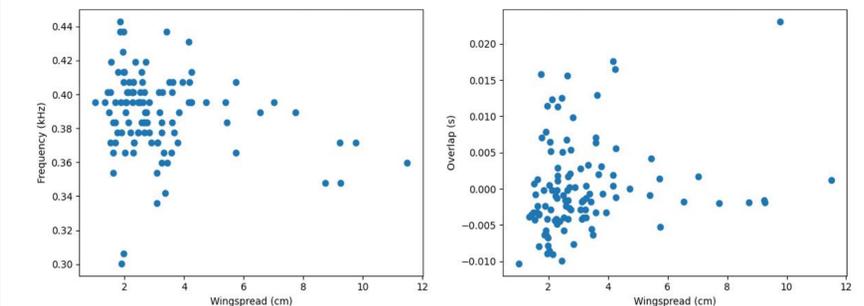


Figure 3. Distribution of song features for male-directed and female-directed songs (frequency of note 1 of IC 1 and overlap between notes 1 and 2 of IC 1)



Results (cont.)

Figure 4. Effect of wingspread on the features plotted in Figure 3



Conclusion

- Song is highly stereotyped across renditions, nearly identical between male-directed and female-directed song
- Song feature variance significantly decreases when wingspread is >2–3 cm
- Limitations: individual differences, broader social context ignored, need more data points

Next Steps

- “Smart aviary” where we can monitor context
- Song potency: What does the female like?



References

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2. Gersick, A. S., & White, D. J. (2018). Male cowbirds vary the attractiveness of courtship songs with changes in the social context. *Behaviour*, 155(1), 1–25. <https://doi.org/10.1163/1568539X-00003475>
3. O’Loughlin, A. L., and Rothstein, S. I. (2010). Multimodal signalling in a songbird: Male audiovisual displays vary significantly by social context in brown-headed cowbirds. *Animal Behaviour*, 79(6), 1285–1292. <https://doi.org/10.1016/j.anbehav.2010.03.001>
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