

# What Does the Cowbird Say?

## Social Modulation of Song in Brown-headed Cowbirds

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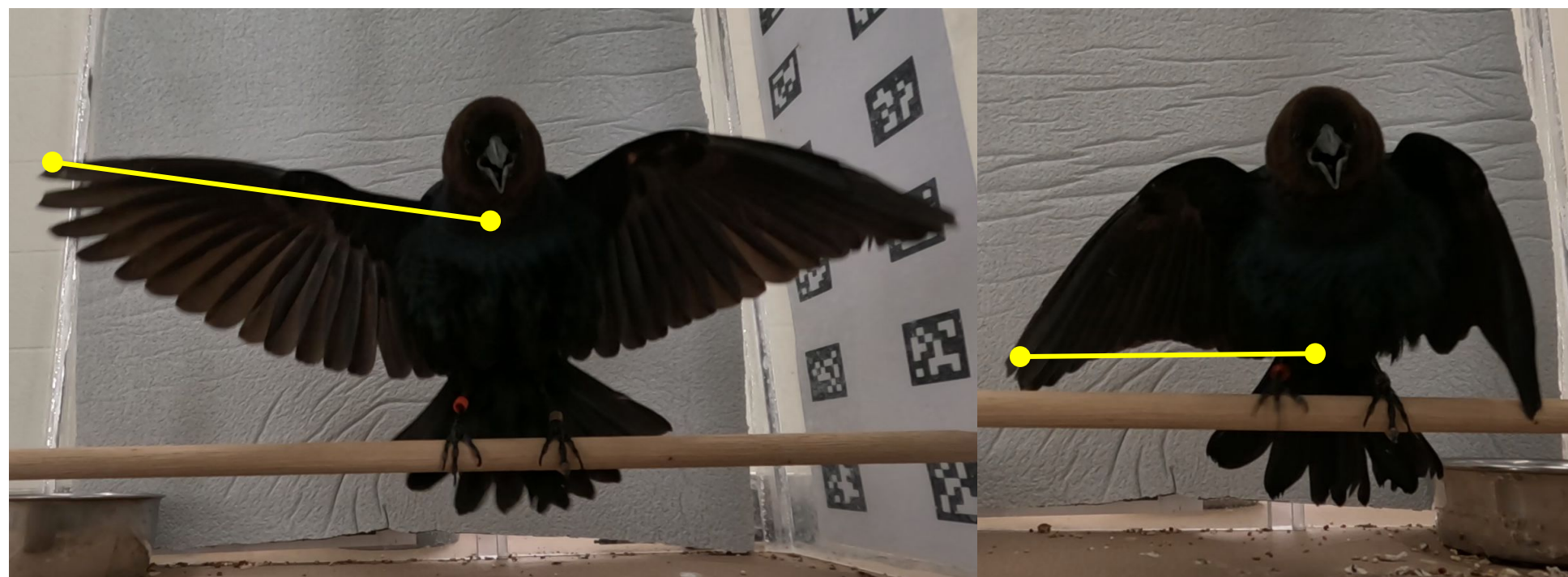
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### Introduction

- Brown-headed cowbirds (*Molothrus ater*) naturally form complex systems and thus are a model for studying social behavior<sup>1</sup>
- The male cowbird song is a feat of vocal athleticism which may give an “honest signal” of neuromuscular control to females, modulated by social context<sup>2</sup>

### Questions

- Previous research indicates that when males sing to females, their wingspread is smaller than when they sing to other males<sup>3</sup>



- 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”<sup>4</sup>)
  - 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

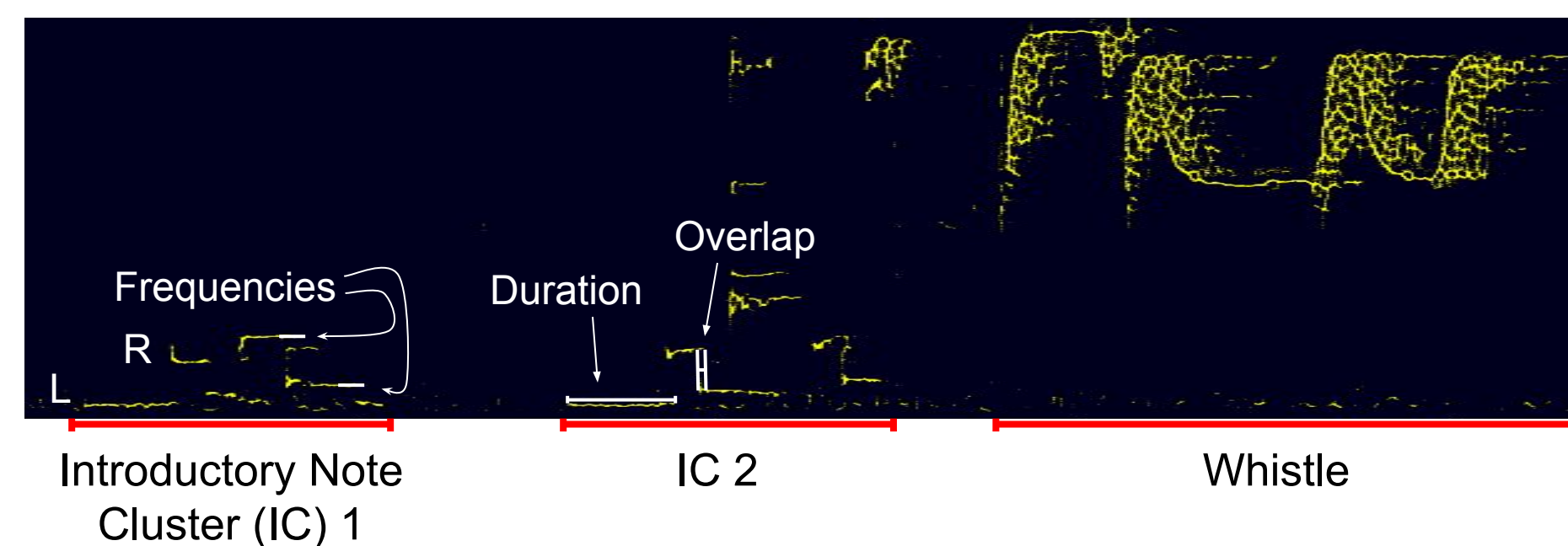


Figure 2. Stereotypy of male-directed and female-directed song spectrograms

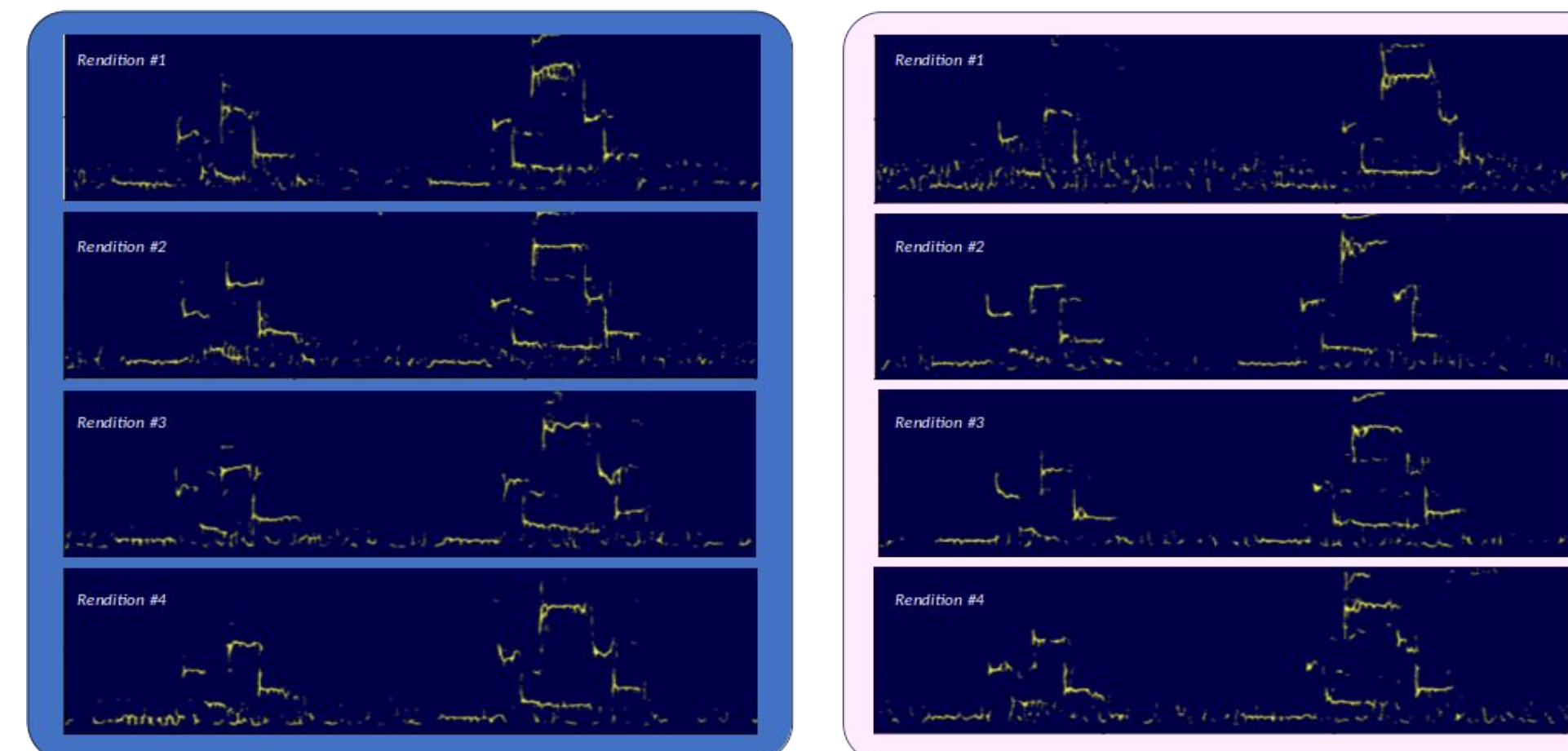
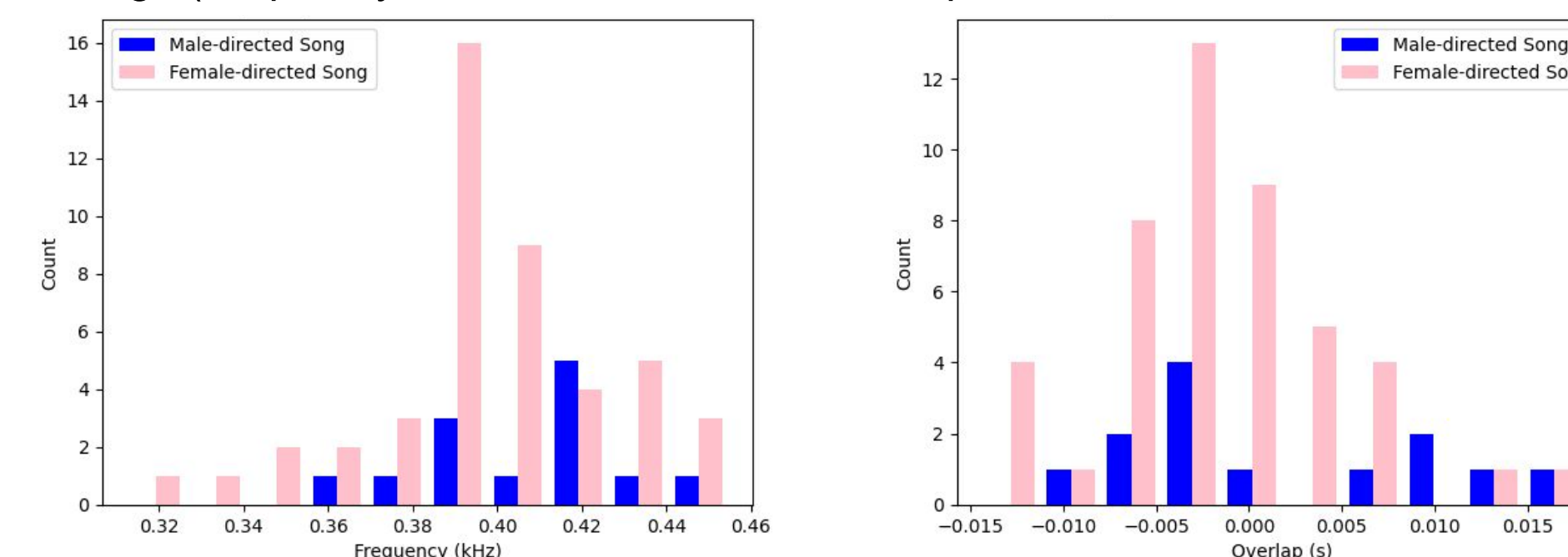
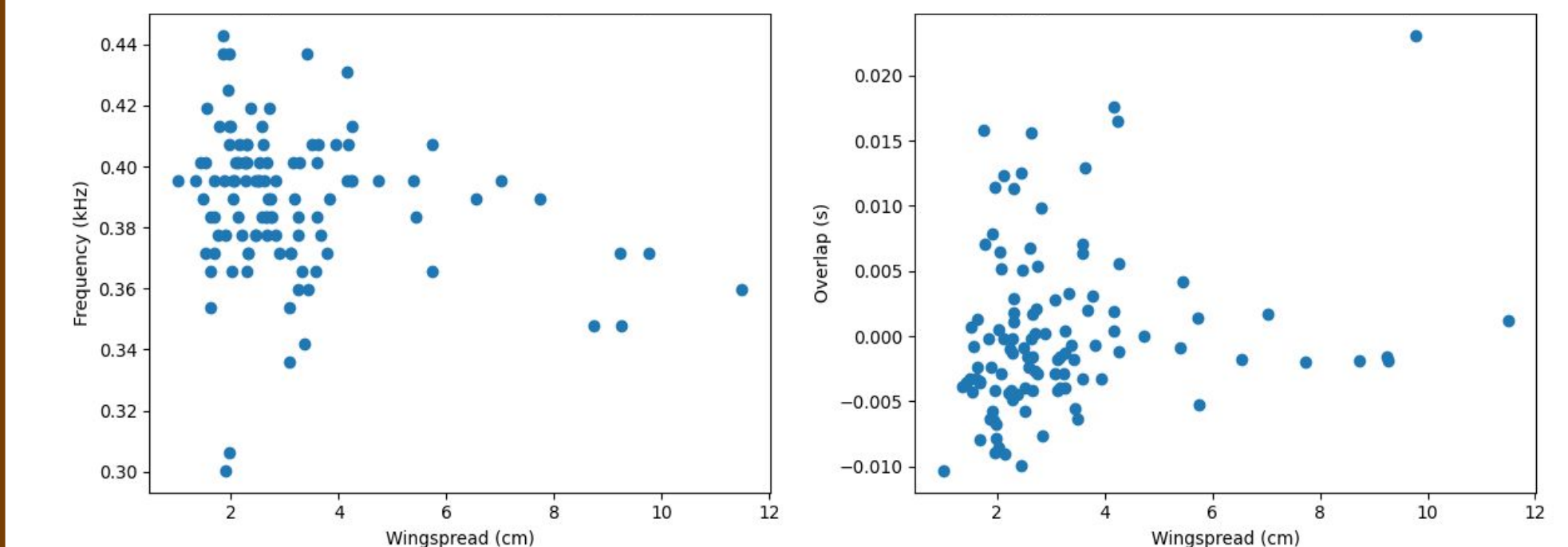


Figure 3. Distribution of song features for male-directed and female-directed songs (frequency of note 1 of IC 1 and overlap between notes 1 and 2 of IC 1)



### Results (cont.)

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

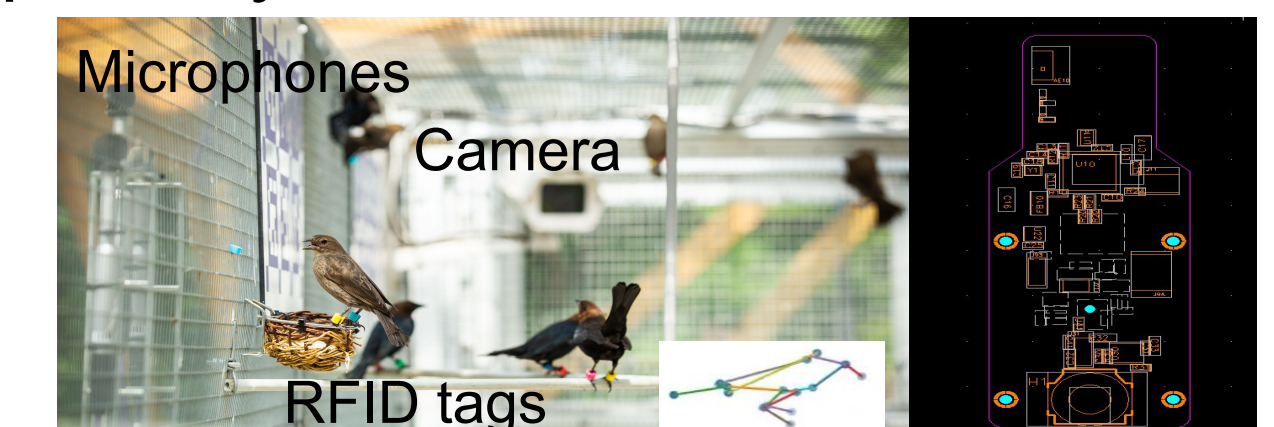


### Conclusion

- 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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