An analysis of *Manacus* collar color and its correlation with mating success in Western Panama

Introduction

In Western Panama, golden-collared and white-collared manakins interbreed in a narrow hybrid zone. The yellow-collared trait of *Manacus vitellinus* has introgressed into *Manacus candei* populations (Parsons et al, Brumfield). This introgression suggests that there is sexual selection for yellow collars. Previous evidence indicates that females prefer yellow collars to white collars (Stein, Uy), however the evidence is scant (K. Bennett personal communication). I explored manakin behavior from 11 hours of video and examined various male courtship behaviors, as well as a preliminary analysis of display success. I measured the relative success of yellow-collared birds and white-collared birds.

Methods

Kevin Bennett used camera traps to record videos of five leks in Panama: Padre de Marcelo (PM), Boca Chica (BC), Leaf Cutter (LC), Bajo la Esperanza (BE), and Gully (GU). I scored videos by behavior from BE, GU, and LC. I (RTL) scored 1,482 videos, and another observer (GWB) scored 2,502. I scored attendance, clearing, display, dance, and copulation. Attendance was defined as male presence in the court. Clearing was defined as a male removing leaf litter from the court. Display was defined as a male snapping and jumping between branches. Dance occurred when both a male and female snapped and jumped between branches. I recorded the duration of each behavior to the second. I used RStudio to analyze the data. Dance and copulation were considered successful behaviors.

First, I examined whether behavior times were consistent between scorers. I found the difference in behavior durations between scorers. Next, I calculated the average amount of time per day that a bird spent doing each behavior. Again, I found the difference in behavior duration between scorers.

Next, I examined whether birds in different leks and with different-colored collars varied in the amount of time they spent doing each courtship behavior. I calculated the average time spent doing each behavior per day, then did the same separating birds by lek, then color. I used the combined datasets for most of the analyses, but used just RTL's dataset when examining by color. Within color, I measured the average duration for each behavior. Next, I found the correlations between each behavior. Lastly, I used a two sample t-test to compare each color within each behavior.

Results

The scorers had a mean difference in behavior of 3 (+/- 31 SD) seconds per day, with GWB usually having shorter durations. The histogram is skewed slightly right (Fig. 1).

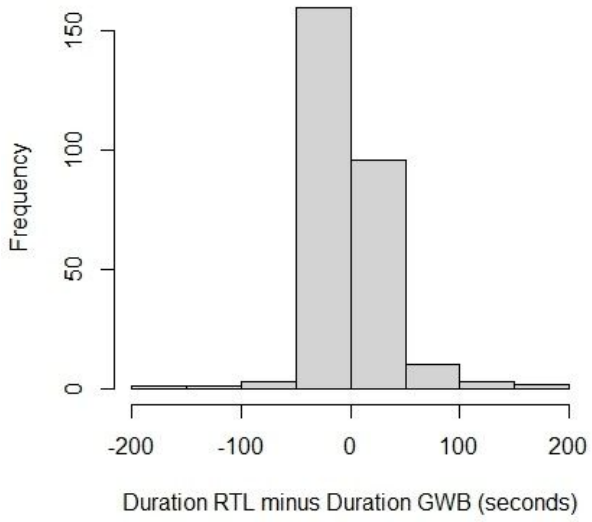

Figure 1. Histogram showing the differences between scorers in daily behavior duration per bird.

The following behaviors are strongly correlated: display and attendance, display and dance, and attendance and dance. Attendance and clearing are weakly correlated (Table 1).

Table 1. Correlation of behaviors with one another. Asterisks indicate p-value < 0.05.

	Display	Clearing	Attendance	Dance
Display	1			
Clearing	0.19	1		
Attendance	0.96*	0.19*	1	
Dance	0.81*	-0.24	0.86*	1

Birds in BE spent about 13 seconds (+/- 14 SD) dancing, 4 seconds (+/- 31 SD) clearing, 70 seconds (+/- 84 SD) attending, and 14 seconds (+/- 18 SD) displaying per day. Birds in GU spent 8 seconds (+/- 2 SD) dancing, 2 seconds (+/- 1 SD) clearing, 34 seconds (+/- 41 SD) attending, and 9 seconds (+/- 6 SD) displaying per day. Birds in LC spent about 32 seconds (+/- 35 SD) dancing, 5 seconds (+/- 3 SD) clearing, 275 seconds (+/- 317 SD) attending, and 4 seconds (+/- 40 SD) displaying per day (Fig. 2).

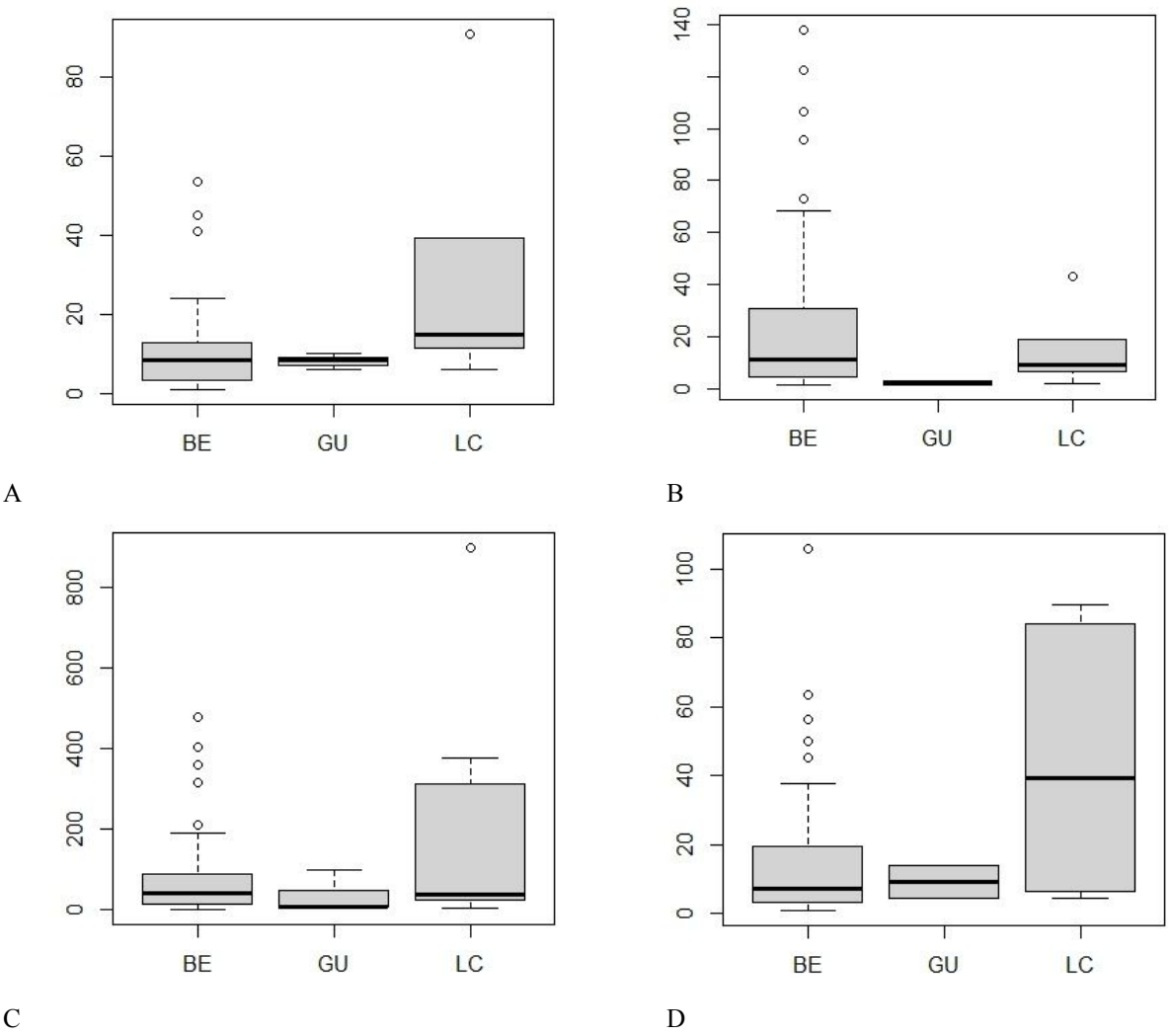

Figure 2. Average daily behavior duration by lek. (A. Dance, B. Clearing, C. Attendance, D. Display)

White-collared manakins spent more time per day attending, clearing, and displaying alone on their courts than yellow-collared manakins, but yellow-collared manakins spent more time dancing with females (Fig. 3). However, court clearing was the only behavior that was significantly different between color forms (Table 2).

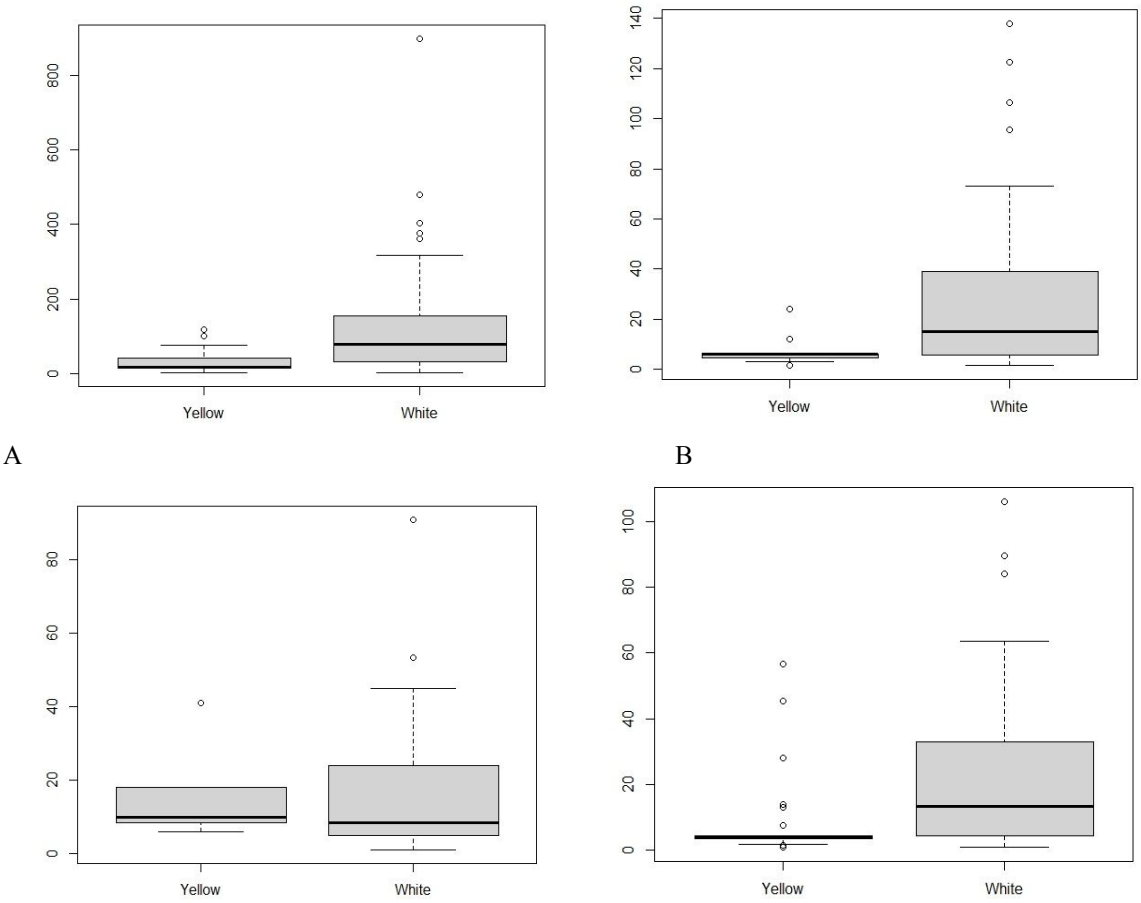

Fig. 3. Average daily behavior duration by lek. (A. Attendance, B. Clearing, C. Dance, D. Display)

Table 2. Two-sample t-test for differences in behavior duration between yellow- and white-collared manakins.

Behavior	**t**	**df**	**p-value**
Display	-1.8	12.76	>0.05
Dance	-0.3	12.90	>0.05
Attendance	-1.3	10.08	>0.05
Clearing	-2.6	12.47	<0.05

Discussion

The small amount of difference between scorers indicates that it is acceptable to combine the data. Attendance and display are strong indicators of dance, showing that birds which spend a

long time attending and displaying are more likely to be successful. There was substantial variation in behavior duration among individuals within the same leks. This shows the strong potential for competition within a lek. White-collared manakins spent more time displaying than yellow-collared manakins, but yellow-collared spent more time dancing white-collared. Since yellow-collared spent more time dancing than white-collared, yellow-collared manakins were more successful on average than white-collared. Furthermore, white-collared birds spent more time attending, clearing, and displaying at the lek, while dancing with females less than yellow-collared. Since yellow-collared males, despite putting in less effort than white-collared males, are more successful, this indicates that yellow-collared may experience positive sexual selection. While these differences are suggestive, more data are needed to confirm these results.

References

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