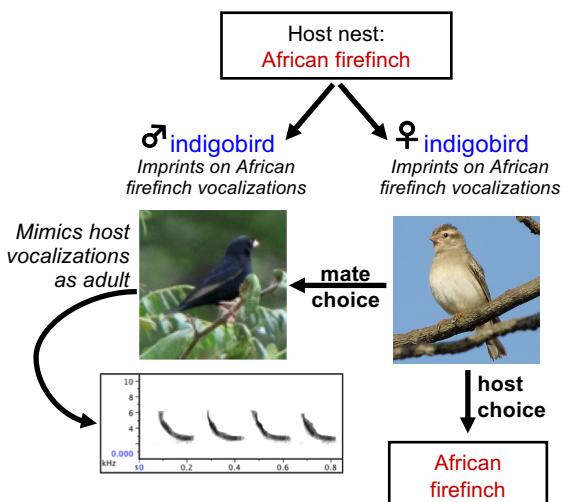


## How is host specificity maintained?



Payne. 1973. Orn. Mono.  
Payne et al. 1998. An. Behav.  
Payne et al. 2000. An. Behav.

**“Cultural isolation”**



*Lagonsticta senegala*



*Vidua chalybeata*



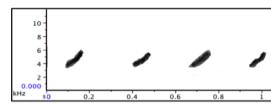
### 3 elements of indigobird songs

#### 1. Host mimicry: advertises identity of host species

– Species-specific



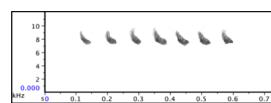
*chalybeata*



*Lagonsticta senegala*



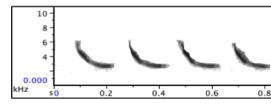
*codringtoni*



*Hypargos niveoguttatus*



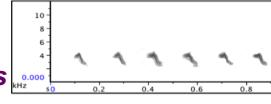
*funerea*



*L. rubricata*



*purpurascens*

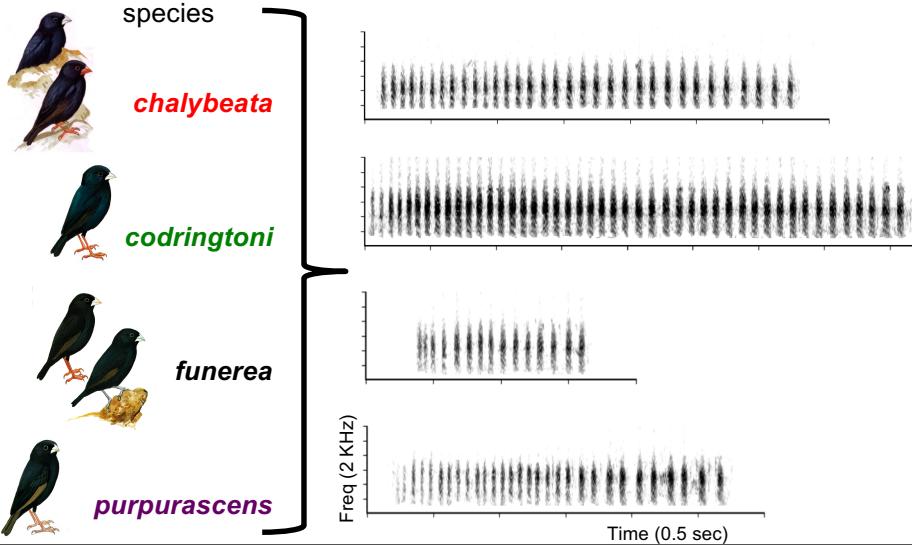


*L. rhodopareia*

## 3 elements of indigobird songs

### 2. Chatter: qualitatively similar in all species

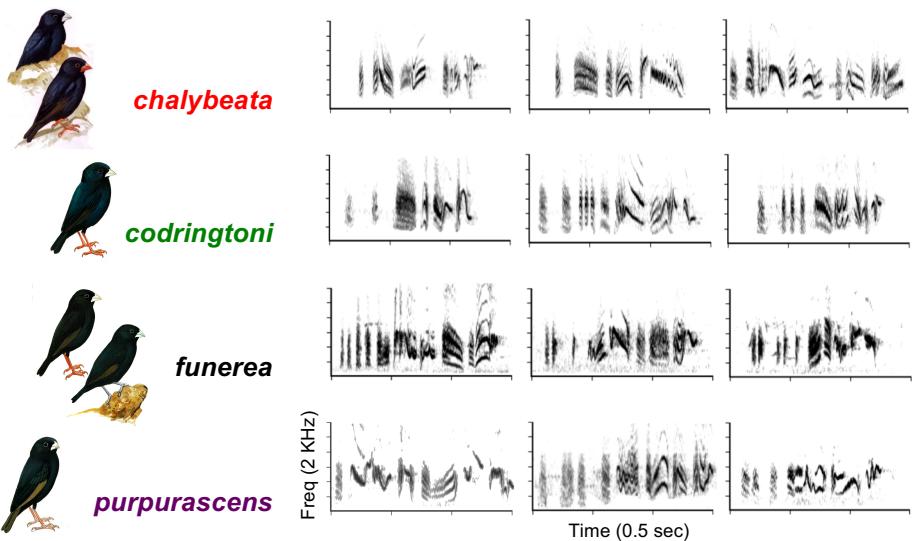
- Appears to be as much variation w/in individuals as among species



## 3 elements of indigobird songs

### 3. Complex non-mimicry: ~10-20 songs per individual

- No overlap among species



## *Repertoire size*

- Do species differ in mean repertoire size?
- $H_0$ : mean repertoire size does not differ among species
- $H_A$ : mean repertoire size is different for at least one species

## *Descriptive statistics*

Species	$\bar{Y}_i$	$s$	$n$
<i>chalybeata</i>	15.7778	1.8329	18
<i>codringtoni</i>	15.5238	2.2275	21
<i>funerea</i>	13.9394	1.3906	33
<i>purpurascens</i>	12.4231	1.2385	26

## *Grand mean*

$$\bar{Y} = \frac{\sum_i n_i \bar{Y}_i}{N} = \frac{18(15.7778) + 21(15.5238) + 33(13.9394) + 26(12.4231)}{18 + 21 + 33 + 26}$$

$$= 14.214$$

## *SS<sub>groups</sub>*

$$SS_{groups} = \sum_i n_i (\bar{Y}_i - \bar{Y})^2$$

$$SS_{groups} = 18(15.778 - 14.214)^2 + 21(15.5238 - 14.214)^2 + \\ 33(13.9394 - 14.214)^2 + 26(12.4231 - 14.214)^2$$

$$= 165.924$$

$$SS_{error}$$

$$SS_{error} = \sum_i s_i^2(n_i - 1)$$

$$\begin{aligned} SS_{error} &= (1.8329)^2(18 - 1) + (2.2275)^2(21 - 1) + \\ &\quad (1.3906)^2(33 - 1) + (1.2385)^2(26 - 1) \\ &= 256.575 \end{aligned}$$

$$SS_{total}$$

$$SS_{total} = SS_{groups} + SS_{error}$$

$$SS_{total} = 165.924 + 256.575 = 422.499$$

**MS<sub>groups</sub>**

$$MS_{groups} = \frac{SS_{groups}}{df_{groups}} \quad df_{groups} = k - 1$$

$$MS_{groups} = \frac{165.924}{4 - 1} = 55.308$$

**MS<sub>error</sub>**

$$MS_{error} = \frac{SS_{error}}{df_{error}} \quad df_{groups} = N - k$$

$$MS_{error} = \frac{256.575}{98 - 4} = 2.730$$

## *F-ratio*

$$F = \frac{MS_{groups}}{MS_{error}}$$

$$F = \frac{55.308}{2.730} = 20.26 \quad F_{3,94} = 20.26$$

## *ANOVA table*

Source of variation	Sum of squares	df	Mean squares	F-ratio	P
Groups	165.924	3	55.308	20.26	3.273e-10
Error	256.575	95	2.730		