Supplementary Material

Supplementary Material Text

Sister pair selection

We measured song discrimination between a Central American population and a geographically proximate allopatric population. For example, we paired the Central American population of the Plain Antvireo *Dysithamnus mentalis* with the related Northern Andes population, as secondary contact with the Northern Andes population is more likely than with Plain Antvireo populations from further south in South America.

Playback experiments: unidirectional vs. reciprocal

Our experiments played songs of males of both populations A and B (where A and B comprise a sister pair) to territorial males of population A. Most sister pairs were tested in only one direction. That is, in nearly all cases we asked whether population A discriminated against song from population B but not the reverse. We were able to conduct reciprocal playback experiments in five sister pairs in which both populations were found within Central America. Song discrimination in these reciprocal cases (discrimination of population A to population B song vs. discrimination of population B to population A song) was highly correlated ($r = 0.95$). These five sister pairs included three oscines and two suboscines, and cases of both high (> 0.66) and low (< 0.33) song discrimination. Though few in number, the tight correlation in these reciprocal cases suggests unidirectional data accurately describes song discrimination in our database of sister pairs.

Impact of treatment sequence

Prior to statistical analysis, we evaluated the effect of treatment sequence on song discrimination. It is plausible that territorial individuals that experienced the sympatric treatment first could be behaviorally "fired up" and more likely to respond to the subsequent allopatric treatment. If so, and if the magnitude of this possible effect differed between suboscines and oscines, our resulting analysis comparing song discrimination between suboscines and oscines would be biased. To examine this question, we compared song discrimination between experiments that first received the sympatric treatment and those that first received the allopatric treatment for populations in which we conducted playback experiments on at least 10 territories (n = 66; suboscines = 21, oscines = 45). We found a strong correlation between song discrimination scores of sympatric first and allopatric first experiments of sister pairs in both suboscines (r = 0.69) and oscines (r = 0.59), and failed to find reduced discrimination of allopatric song in sympatric first experiments, as predicted by the "fired up" hypothesis. Instead, we found that discrimination of allopatric song was greater in sympatric first experiments around half of the time (54% of suboscine sister pairs and 48% of oscine sister pairs), suggesting that treatment sequence has little overall influence on discrimination of allopatric song in our dataset.

Figure S1. Genetic distances in mitochondrial DNA in sister pairs are highly correlated with branch length distances from multi-locus phylogenies (multi-locus data downloaded from birdtree.org). Genetic distances are in units of percent differences.

Figure S2. Suboscine sister pairs (blue triangles) show a trend for a faster rate of song discrimination given absolute acoustic divergence than do oscines (orange circles). Trendlines illustrate predictions from a Michaelis-Menten model.

Figure S3. Density estimation for suboscines (A) and oscines (B) from the "mclust" package (Fraley et al. 2012), which fits Gaussian mixture models to measure relative support for the number of distributions with equal variances ("components") that are sampled from to generate the observed univariate distribution. The top supported model for suboscines (A) had two components ($\Delta BIC = 9.32$) and the best supported model for oscines had one component ($\Delta BIC = 0.92$)

Figure S1

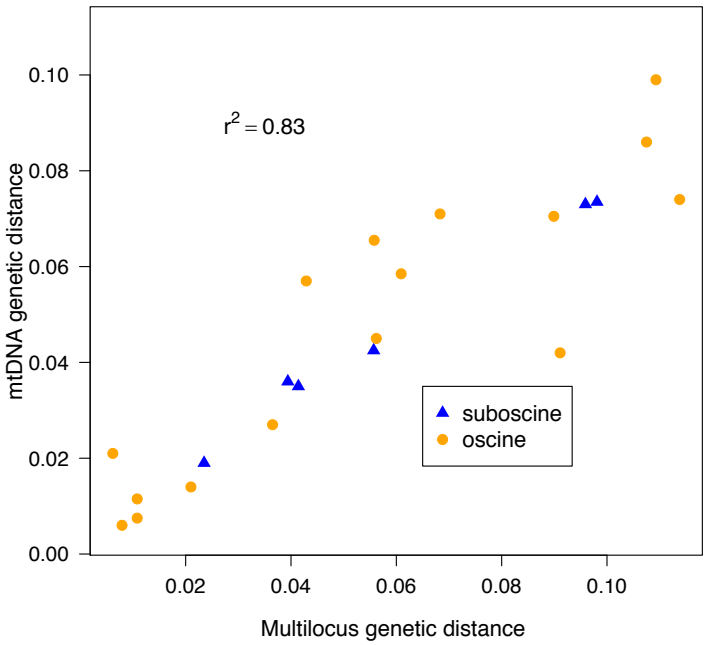

0.10
0.08
0.06
0.04
0.02
0.00
mtDNA genetic distance
r² = 0.83
suboscine
oscine
0.02
0.04
0.06
0.08
0.10
Multilocus genetic distance

Figure S2

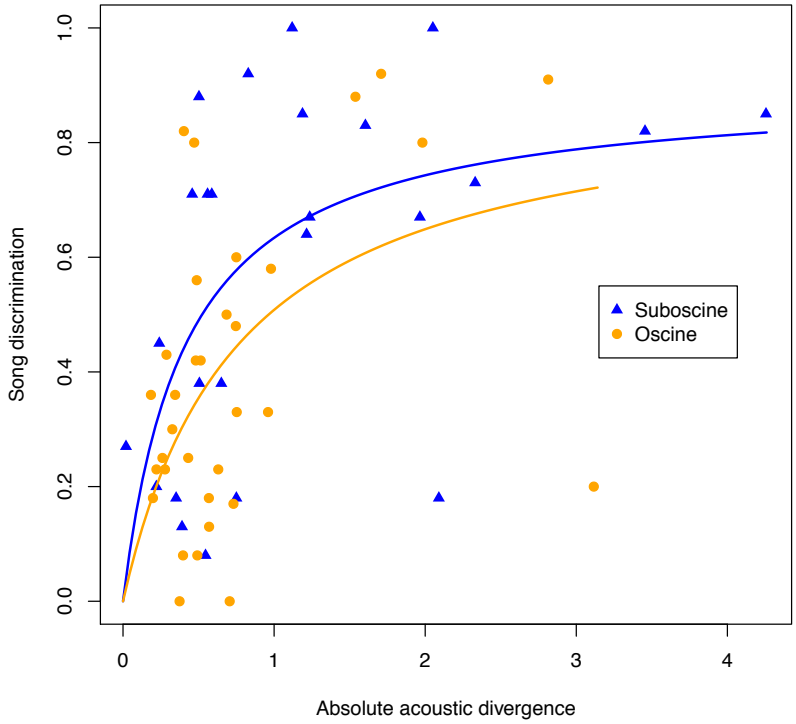
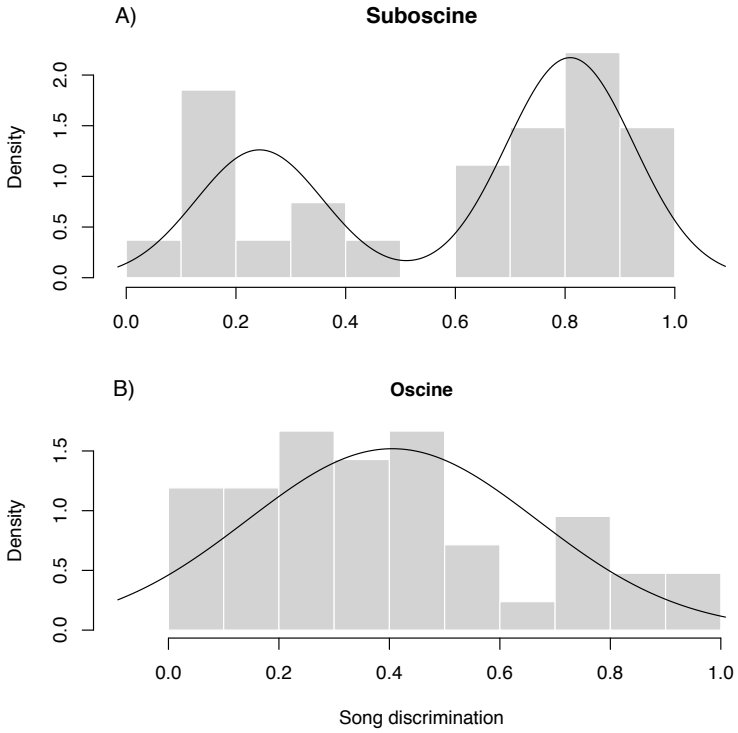

Song discrimination
0.0
0.2
0.4
0.6
0.8
1.0
0
1
2
3
4
Absolute acoustic divergence
Suboscine
Oscine

Figure S3


A)
Suboscine
Density
0.0
0.5
1.0
1.5
2.0
0.0
0.2
0.4
0.6
0.8
1.0
B)
Oscine
Density
0.0
0.5
1.0
1.5
0.0
0.2
0.4
0.6
0.8
1.0
Song discrimination