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Black Phoebes Sing More Often in Noisier Anthropogenic Environments

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INTRODUCTION

Anthropogenic noise, such as traffic noise, is common and widespread and may influence animal behavior. Bird song behavior is a long-distance acoustic communication modality, used for heterospecific, conspecific and individual recognition, mate attraction, and territory defense (Catchpole & Slater 2003; Bradbury & Vehrencamp 2011). How traffic noise influences bird communication is an important question to understand how increasing urbanization influences animal populations.

A bird that might be affected by traffic noise is the Black Phoebe (*Sayornis nigricans*), a suboscine songbird that occurs in both rural and urban areas. In contrast to oscines, song in suboscines is innate and not learned, so it is thought to be less plastic (Touchton et al. 2014). Areas with high traffic noise presents a communication challenge for Black Phoebes because the background noise from cars may overlap with their song. One strategy to overcome this challenge is to sing more often.

My objective was to investigate if Black Phoebes adjust their singing behavior in response to car traffic in urban and rural sites in Arcata, California. I predicted Black Phoebes will sing more often in the presence of cars to avoid signal overlap with traffic noises.

METHODS

I gathered my data on Black Phoebe songs and car abundance in urban and rural agricultural areas in Arcata, California during February and March 2022.

For each focal bird, I wrote down the date, study site, latitude and longitude, bird ID, how many songs the Black Phoebe sang during two-minutes, the number of cars that passed by within 30m of the bird, and heterospecific bird abundances. I also used a sound level meter app to record traffic noise at a subset of locations.

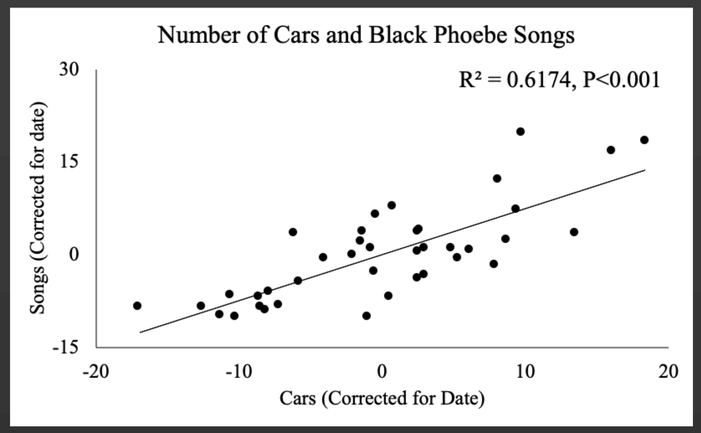

Fig. 1: Black Phoebes sang more when there was more traffic, after correcting for time of year.

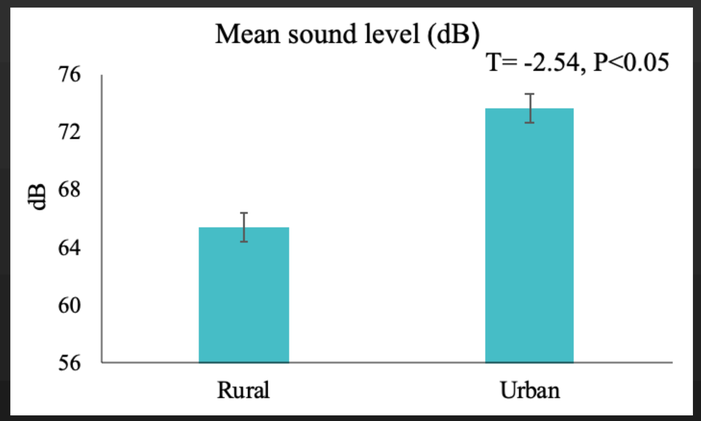

Fig. 2: Urban sites were noisier.

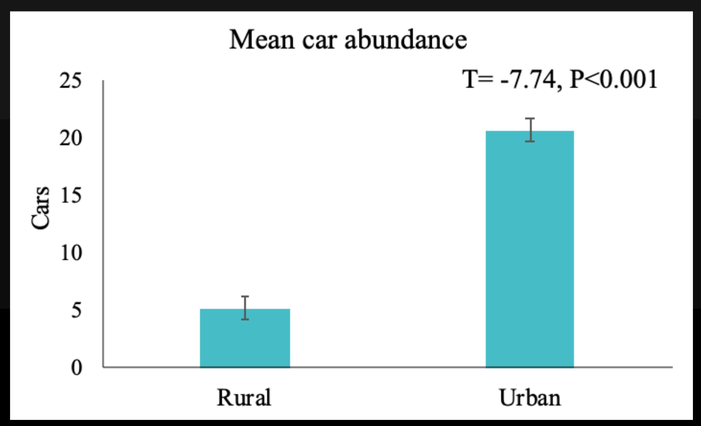

Fig. 3: There were more cars in urban sites.

RESULTS

I found significant relationships between songs and time of year ($R^2 = 0.20$, $P<0.001$), and traffic and time of year ($R^2 = 0.34$, $P<0.001$). After correcting for date, I found Black Phoebes sang more often when there was more car traffic, possibly to avoid signal overlap with traffic noises (Fig. 1, $R^2 = 0.62$, $P<0.001$).

The background noise (Fig. 2, T= -2.54, $P<0.05$) and mean car abundance (Fig. 3, T= -7.74, $P<0.001$) were significantly higher in urban sites than in rural sites.

I found no relationship between black phoebe songs and heterospecific abundances ($R^2 = 0.0074$, $P = 0.61$).

DISCUSSION

Anthropogenic noise like that from traffic may influence a bird's ability to communicate because the background noise overlaps with their signal. In support of my hypothesis, urban sites had more traffic, were noisier, and Black Phoebes tended to sing more often when there were more cars, even after correcting for confounding variables like time of year.

There is limited evidence on how suboscine song frequency and amplitude are affected by traffic noise (Gentry et al. 2017), but it is typically thought to be less plastic than oscine songs (Ríos-Chelén et al. 2017). My study provides evidence, however that suboscines may meet the challenge posed by anthropogenic background noise by singing more often, possibly to avoid signal overlap. Whether singing more frequently optimizes communication remains to be tested, and those data are important to understand how animals respond to anthropogenic noise.

ACKNOWLEDGEMENT

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LITERATURE CITED

Bradbury JW, Vehrencamp SL. 2011. Principles of animal communication. 2nd ed. Sunderland (MA): Sinauer Associates.

Catchpole C, Slater PJB. 2003. Bird song: biological themes and variations. Cambridge:Cambridge University Press.

Gentry, K. E., M. F. McKenna, and D. A. Luther. 2017. Evidence of Suboscine song plasticity in response to traffic noise fluctuations and temporary road closures. Bioacoustics 27:165–181.

Ríos-Chelén, A. A., C. Cuatianquiz-Lima, A. Bautista, and M. Martínez-Gómez. 2017. No reliable evidence for immediate noise-induced song flexibility in a Suboscine. Urban Ecosystems 21:15–25. Ecosystems 21:15–25.

Touchton, J. M., N. Seddon, and J. A. Tobias. 2014. Captive rearing experiments confirm song development without learning in a tracheophone Suboscine Bird. PloS one. Public Library of Science. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4005748/> Accessed 20 Apr 2022.