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# COLOR PREFERENCE IN THE BROWN-HEADED COWBIRD

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## ABSTRACT

This study investigated the color preference of the Brown-headed Cowbird. The cowbird is an intelligent species that exhibits parasitic behavior upon the nests of songbirds, so further understanding of their behavior is important in the conservation of songbird populations. Previous studies have shown that color can affect the feeding patterns of birds in captivity, but less is known about color preference in wild birds. This study hypothesized that Brown-headed Cowbirds would prefer to feed from a blue bowl and was based on previous studies. The Brown-headed Cowbirds were observed through trail cameras over a period of two weeks. Each color bowl was filled with the same amount and type of food, with a black bowl filled with water in the middle to further attract birds. After two weeks, the photos were analyzed with individual feeding events being recorded and translated into Excel. The data was then analyzed using a Chi-Square test, where the p-value was found to be well below the 0.05 required for the result to be significant. The results indicated that Brown-headed Cowbirds prefer to feed from blue bowls, and the null hypothesis was rejected.

*Key words: Color preference, brown-headed cowbird, color vision, feeding*

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## INTRODUCTION

Vision is an important sensory channel for communication and perceiving the environment. Most bird species rely heavily on vision and are well-adapted to take full advantage of this sensory channel. They can see light wavelengths ranging from 315 nm to 750 nm. Compare this to humans, whose eyes can only perceive from 380 nm to 740 nm. It is not just that birds can perceive all these wavelengths, they also have an effect on the bird's behavior. A study conducted on broiler chickens found that blue (450nm) and green (550nm) light had a positive effect on body weight increase of the birds and red (700nm) light was

found to negatively affect body weight increase and caused an increase in aggressive behavior and activity (Soliman and El-Sabrou, 2020). In captivity color can affect the feeding behavior of birds, but how does it affect the behavior of wild birds with more choice of where they feed? A species of particular interest to us was the Brown-headed Cowbird. This species exhibits a litany of remarkable behaviors that show that further research into their intelligence is warranted. For example, not only do Brown-headed Cowbirds parasitize other nests but they also have been recorded destroying the nests of other birds to create additional opportunities to parasitize the nest when it is rebuilt (Hoover and Robinson, 2007). This behavior happens much more frequently to nests that had previously had

a Brown-headed Cowbird egg laid in them, but it was removed by the host birds (Hoover and Robinson, 2007). It is additionally important to better understand the behavior of this species because it is an obligate parasite that can have a negative impact on other songbird populations, especially those that are already endangered due to habitat loss. The least Bell's vireo and southwestern willow flycatcher are two examples of birds that rely on outside control of cowbird populations to survive in their endangered state (Peer et al., 2020). If Brown-headed Cowbirds show significant preference or dislike towards certain colors it may provide more information on how we might keep them from parasitizing nests of endangered birds. Based on previous studies, we hypothesize that Brown-headed Cowbirds will prefer to feed from the blue bowl.

## MATERIAL AND METHODS

Our experiment was conducted in Hustontown, Pa at one of our group members, Shawn's, house. Due to cowbirds' preference for fragmented environments where the field meets forest, an area between two trees on the edge of the field was chosen for the study, both to appeal to local cowbird

populations and to provide adequate cover to any bird that attempts to eat.

To gather data, a metal rack around four feet long was hung five feet off the ground, in between two trees. On this rack were four bowls, three of which were filled with identical parrot food, and the fourth containing water. The three bowls containing food each had a different color: orange, pink, and blue. Trail cams were hung on trees positioned on either side of the rack and set to take photos whenever motion was detected. After two weeks of observation and occasional checks to see if the cameras were properly aligned, the SD cards were removed and the data on them was analyzed.

When looking through the pictures, cowbird feeding events were recorded on paper and translated into an Excel workbook. A feeding event was recorded any time a cowbird was seen actively eating at or perched on the side of one of the bowls. If a cowbird was seen at the same bowl over multiple pictures, additional feeding events on that bowl would not be recorded. If a cowbird was seen moving from one bowl to another, a feeding event would be counted on both bowls.

## RESULTS

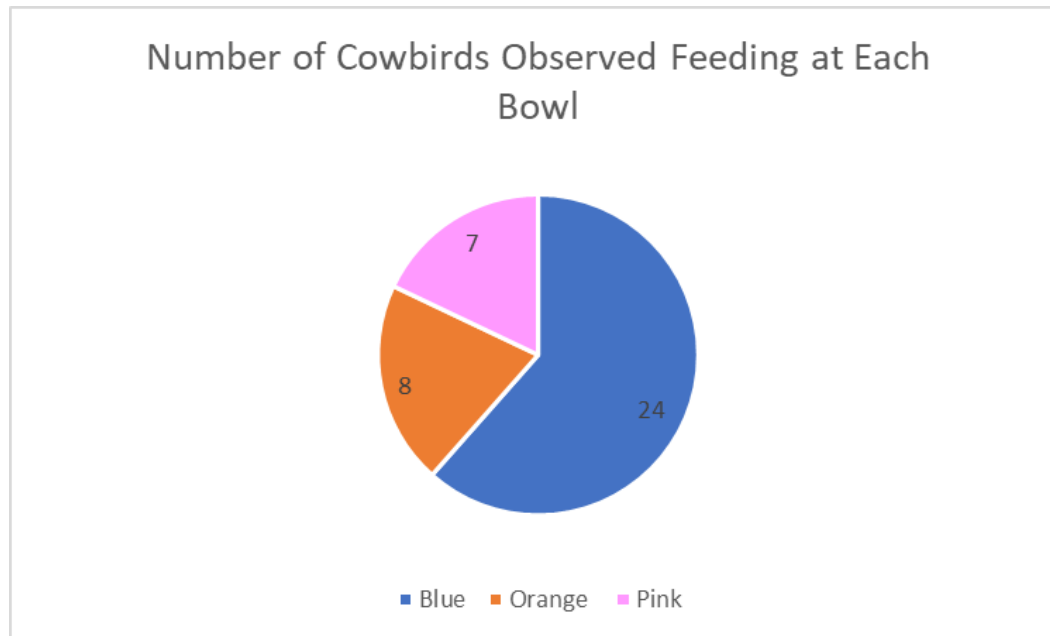
	Blue	Orange	Pink	Total observations
Observed	24	8	7	39
Expected	13	13	13	

Fig 1. Raw data; count of cowbird feeding events observed at each bowl

	Observed	Expected	Difference	Difference Sq.	Diff. Sq. / Exp Fr.
Blue	24	13	11.00	121.00	9.31
Orange	7	13	-6.00	36.00	2.77
Pink	8	13	-5.00	25.00	1.92
					14.000

The Chi<sup>2</sup> value is 14. The *p*-value is .00091. The result is significant at  $p < .05$ .

Fig 2. Chi-square goodness of fit test calculated on social science statistics



*Fig 3. Pie chart breaking down how many feeding events were recorded at each bowl*

Based on the Chi-Square having a p-value well below .05, the null hypothesis that the cowbirds would have no preference towards any one color can be rejected. From the raw data and the pie chart, it can be clearly seen that the birds studied showed a strong preference for food from the blue bowl.

## DISCUSSION

According to Texas Parks and Wildlife, the brown-headed cowbird is a direct threat to 225 known species of North American songbirds, including endangered species such as the Kirtland's Warbler and the Black-Capped Vireo. To effectively limit the impact of an animal like the cowbird, it is important to understand as much about it as possible. Understanding what colors Cowbirds are the most partial to can possibly be used to make bird feeders in areas with fragmented forests less appealing and this could possibly limit the resources available to this devastating brood parasite. Removing the blue bowl from the rack and starting another observation period to see how the Cowbirds respond to the lack of their preferred color and if this impacts how many end up feeding in the observed area could have provided valuable insight and would be a good place to start

for further study on this topic. Additionally, further study on how Cowbirds react and see other colors could help make bird feeders as unappealing as possible to Cowbirds without negatively impacting other birds that are reliant on human-supplied food. Until we better understand the cowbird color preference, the data gathered from this study suggest that people interested in setting up bird feeders or bird houses in areas with a high populations of cowbirds should avoid using the color blue, as cowbirds do seem to have a strong preference for it.

## CONCLUSION

This study aimed to investigate the color preference of Brown-headed Cowbirds in terms of their feeding behavior. The Brown-headed Cowbird is an interesting species that exhibits parasitic behavior upon the nests of other songbirds, which can have a negative impact on the conservation of endangered species. Previous studies have shown that color can affect the feeding behavior of birds in captivity, but less is known about color preference in wild birds. The data was then analyzed using a Chi-Square test, which showed that the Brown-headed Cowbirds had a strong preference for feeding from the blue bowl, thus rejecting the null hypothesis that

there would be no preference towards any one color. Understanding the behavior of the Brown-headed Cowbird is important for the conservation of songbird populations, particularly those that are already endangered due to habitat loss. The results of this study provide valuable information on how color can influence feeding behavior in wild birds, which may help in developing strategies to prevent Brown-headed Cowbirds from parasitizing the nests of endangered birds.

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