BIRDS PREFER UNOCCUPIED BIRD FEEDERS COMPARED TO FEEDERS WITH REALISTIC OR NON-REALISTIC THREATS

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ABSTRACT

Antipredator behavior is an essential principle in being a foraging bird. Birds observe their environment for threats and make decisions based on these observations which often have the goal of optimizing success in survival. We studied the birds of Purchase College to observe their feeding behavior in the presence of a threat to further understand their threat assessment, and what they determine to be threatening. We assessed two categories of objects- "realistic" meaning emulating a threat in which they may already be familiar with in the real world, and "nonrealistic" meaning a completely unfamiliar foreign object- and while there was no significant difference between these two categories, there was a clear preference for each respective control (empty) feeder compared to the experimental feeder. Purchase College birds show caution to potential threats, regardless of how realistic or familiar they are to that threat.

Keywords: Bird feeding, bird behavior, foraging, predation, preference

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INTRODUCTION

Humans are no different than other animals in that we all make observations which influence our behavior. The decision-making process of an individual varies dependent on the surrounding environment and familiarity with the situation (Desportes et al. 1990). Safety, well-being, and optimizing resources are all common principles to consider in the decision-making process among many different animals. This pattern can be observed in colonial spiders, for instance, in which the spiders make the decision between whether they prioritize success in foraging or success in anti-predation (Raylor and Uetz 1990). Similarly, birds also express behavior in which they show high regard for safety from predators (Desportes et al. 1990).

Birds are intelligent creatures who assess their environment for threats before and even during their foraging processes (Desportes et al. 1990, Morrison 2011). This is an essential component in their antipredator behavior that optimizes the patterns of their feeding. Brandt et al. (2007) suggested that predation is relatively unimportant in shaping the daily feeding pattern of birds; however, Sam and Fuchs (2011) recognized that tit feeding differed based on what type of threat was near their experimental feeder, and how high the threat level appeared to be to the bird.

Assessing for threats is important in bird foraging success, but what exactly a bird deems as threatening is less clear to us. Experience with the specific threat is certainly the most easily understood way in which birds can recognize a familiar threat, but if a bird may have never been introduced to something, it's more difficult to understand how they may find it threatening. Novakova et al. (2017) concluded that the assessment of a threat for their experimental titmice was mostly dependent on key features in which they recognized, and the birds showed less influence by the spatial orientation of those features. In other words, parts have more of an impact on the birds' decisions than the whole picture. Birds recognized a part of a threat it was once familiar with rather than recognizing a whole ensemble as being threatening.

We observed the patterns Purchase College birds exhibit when choosing to feed at feeders where there is a potential threat, compared to where there is no obstruction. We explored how finely-tuned our birds' anti-predator behavior is in regards to objects they have low or no familiarity with, as well as objects that may be more realistic and emulate a real-life threat they face. The goal of this experiment is to express if and how the presence of a foreign object impacts bird feeding by counting how often and how long the birds visit a feeder. We want to more greatly understand how birds categorize threats and the relationships they choose to have with different types of threats, based on how they have assessed it. We predict that in the presence of a threatening, realistic object, there will be a low amount of bird activity (number of visits to the feeder and number of different species). As the variable object begins to look less like a known threat, bird abundance will increase. There will be an indirect relationship between the realism of the object and bird abundance.

METHODS

Study Area. The field site of the experiment was the Purchase College native plant garden. The garden is a small open space with an adjacent woodlot. Dividing the two is a walkway, and the rest of the garden is surrounded by road. A picnic bench is located in the middle of the garden, from which data was collected. There are five small trees in the garden and four native plant beds. Alongside the field site was a small construction site from which human activity and loud noises were encountered at times throughout the study.

Field Data Collection. Field data collection is almost entirely observational. Two bird feeders filled with the same brand of seeds are placed at least 50 ft. from the observation site. In order to accurately count the number of visits to both feeders simultaneously, we found it best to place them in a fashion which both were easily visible from our site of observation, approximately 3 yards apart. Black oil sunflower seeds were used in this experiment. One feeder is the control and the other is the experimental feeder that has a prop attached. The six props that were tested include a small Christmas ornament, a large Christmas tree ornament, a small decoy bird, a decoy owl, a shoe, and a scarecrow which we created by putting a shirt on a hanger and hanging it next to the feeder. First, a timer was set to 30 minutes and observation began from a bench approximately 50 ft. from the feeder. Each bird visit of any length of time, to either feeder, was recorded for the exact amount of time it remained on the feeder. At the end of the 30 minute trial, the prop was switched to the neighboring feeder and studied for a second 30 minute trial. Conducting two trials in which the experimental feeder is swapped was essential to eliminate any possibility that there was a

predetermined bias for a given feeder in the bird community, as the conditions and exact location for the feeders did vary slightly.

RESULTS

The total number of visits to the prop and control feeder were recorded (Fig. 1). It displays the small ornament had no visits to the prop feeder during its trial while its empty feeder had 12 total visits. It also shows that the small bird had 17 less visits than its corresponding empty feeder. Meanwhile, the shoe trial resulting in an equal number in visits to both feeders. There were almost twice as many bird visits to the empty feeder compared to the prop feeder for 5 out of 6 objects.

We also recorded the total amount of time spent on each feeder (Fig. 2). The amount of time indicates a clear preference for the empty feeder in every trial. The small bird trial had the biggest difference, birds stayed on the empty feeder for 2325 more seconds than the prop feeder.

We thought a good way to display the birds' preference for the empty feeder was by showing the difference in total number of visits (Fig. 3) and total difference in time (Fig. 4). In all cases besides the shoe, the empty feeder received more visits, we subtracted the number of visits to the prop feeder from the number of visits to the empty in order to highlight this preference. Similarly, with the amount of time spent, we subtracted the number of time spent at the prop feeder from the total time spent at the empty feeder. This clearly shows the birds preference to the empty feeder.

Figure 5 shows a comparison between the time spent on the empty feeder between two categories of prop. We defined the small ornament, large ornament and the shoe as our unrealistic props and the small bird, owl and scare-crow as our realistic props. We added all the established differences in time spent on the feeders from Figure 4 for each of our defined categories to determine the total difference in time spent at unrealistic prop feeders compared to their control, and realistic prop feeders compared to their respective control. This showed that birds spent 128 seconds more on the empty feeder when the more realistic props were present.

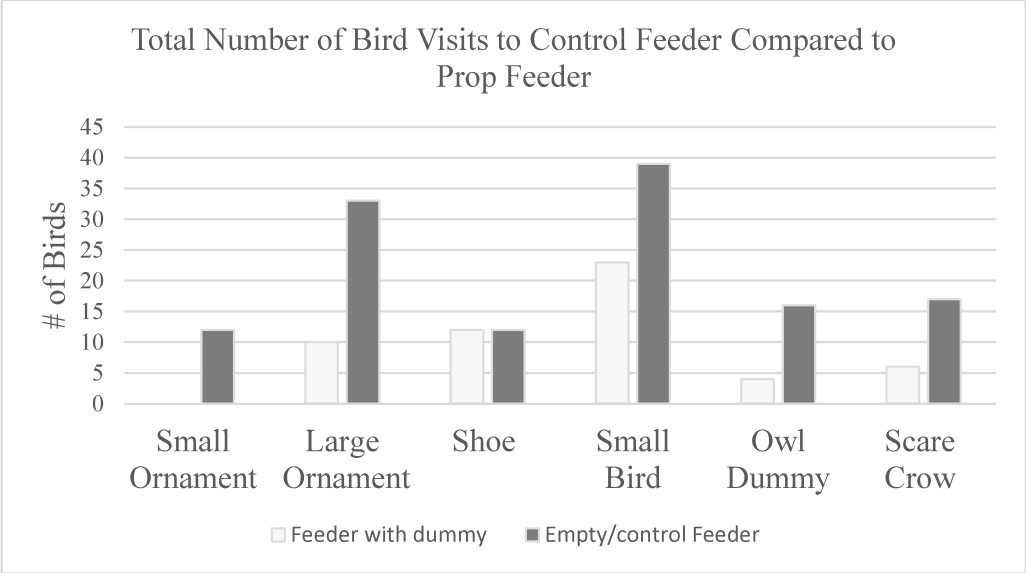

Figure 1. The number of visits to a feeder with a prop present compared to their respective control feeder where no prop was present.

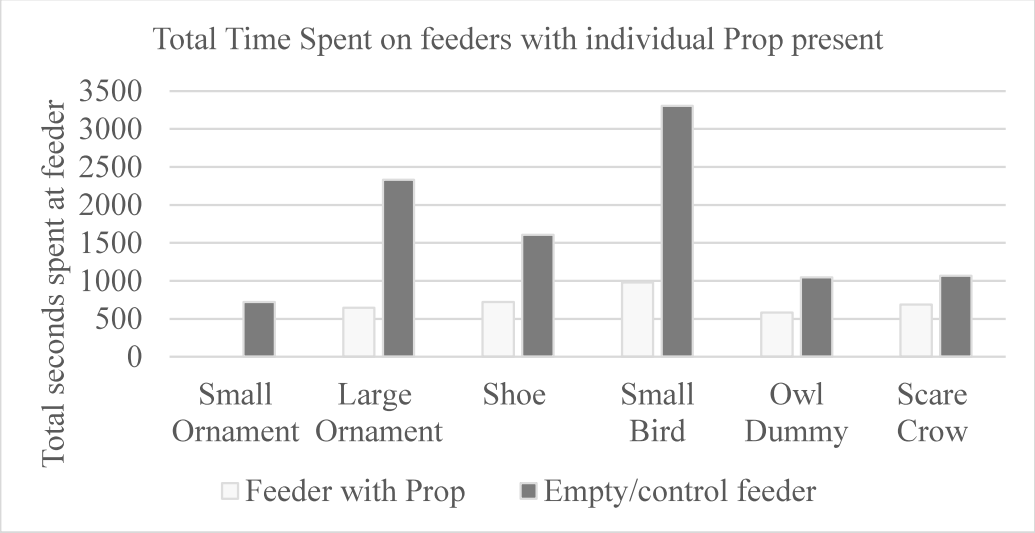

Figure 2. The total amount of time in seconds spent on a feeder with a dummy present compared to its respective control feeder where no dummy is present.

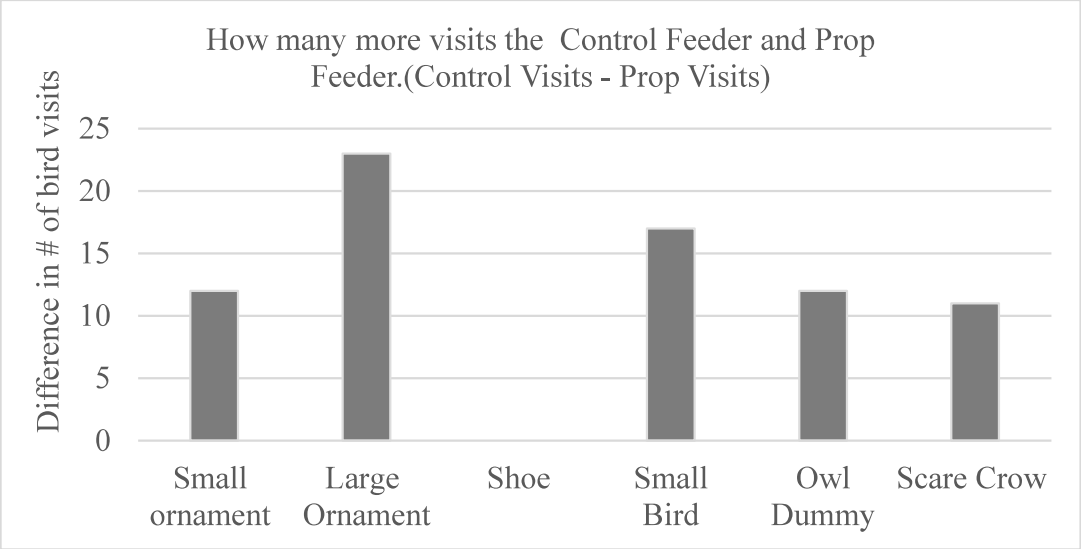

Figure 3. Comparison between the total amount of visits to the control feeder versus the feeder with the dummy present. We took the total number of visits to the dummy feeder and subtracted it from the total number of visits to the control feeder. We used the equation number of visits to control minus number of visits to dummy.

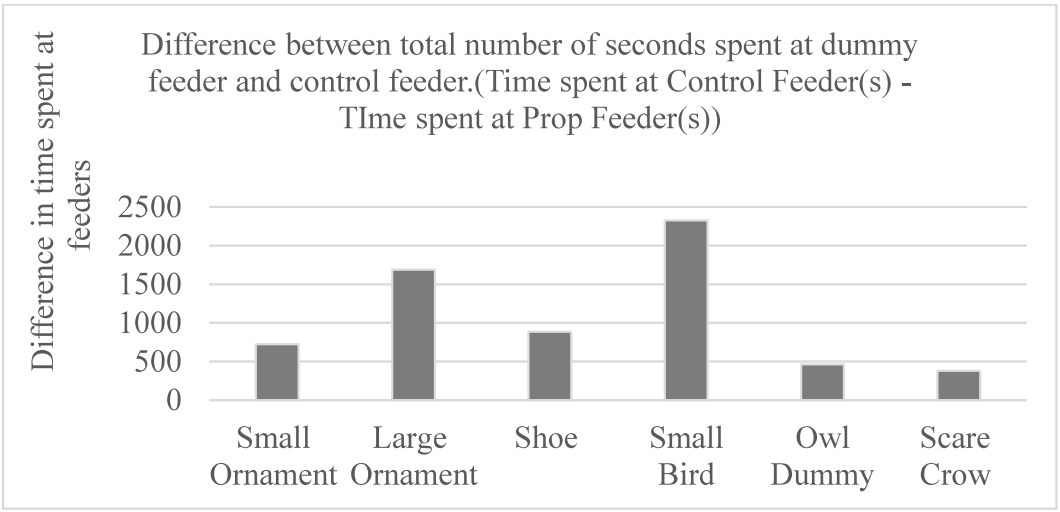

Figure 4. Comparison between the total amount of time in seconds spent on the control feeder versus total time in seconds spent at the feeder with the dummy present. We took the total time (sec) of the prop feeder and subtracted it from the total time (sec) of the control feeder with no dummy present. We used the equation total time spent at control (s) minus total time spent at dummy (s).

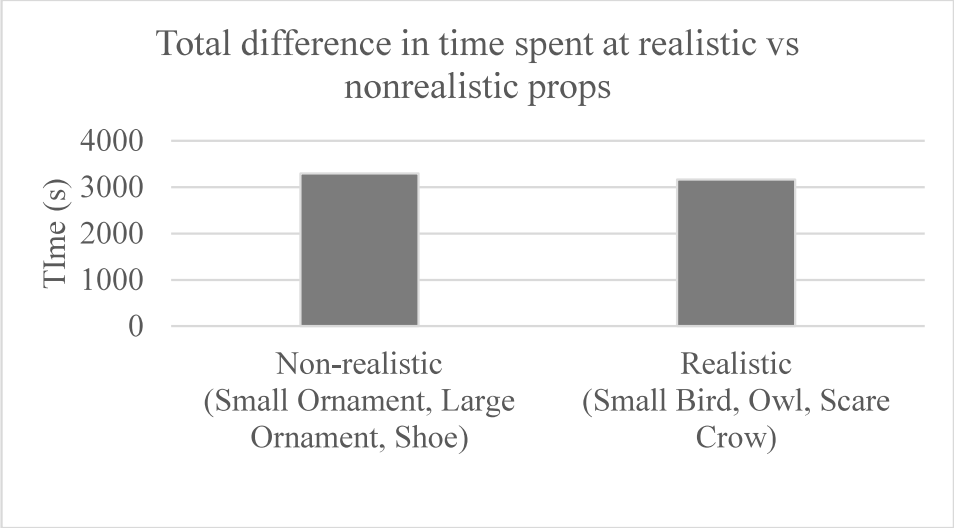

Figure 5. Comparison between the amount of time spent on the empty feeder due to prop, realistic vs non-realistic.

DISCUSSION

Our results suggest an object on or near the feeder did affect the birds feeding habits. The control/empty feeders had more birds visit as opposed to the experimental feeders. Throughout the experiment, birds would often check out the props on the feeders, flying around them but not landing at first as if they were assessing them to see if it was safe to feed. Overall, the birds did not reach a point where they fully trusted the props, as the feeders with the props remained significantly untouched compared to their controls. There was not a significant difference in the "realistic" (large bird prop, small bird prop, scarecrow) and the "non-realistic" (large ornament, small ornament, shoe) in terms of visits.

The location of the bird feeders was quickly realized to be crucial since goldfinches, which held the majority of the birds seen in the experiment, are picky about where they feel comfortable feeding (Dunn et al. 1990). Finches in general are measured in their searches for food, and pick their competition wisely, knowing the consequences (Krabbe 2004, Beal et al. 2011). The size and realistic properties didn't play too much of a role with these finches, as both attracted and scared away birds virtually evenly. But according to Popp (2010), goldfinches again know when and when not to advance on a risky situation during feeding. We did see instances of these finches flying up and around our props, sizing them up, which not only tells them, but other birds watching whether this is a safe object or not. Based on what the object looks like and its general vicinity to safety which in this case was the brush about 50 feet away, helped the birds determine whether each object as harmless or not, which is very typical and precautionary behavior for goldfinches (Dunn et al. 1990, Popp 2010).

We also saw human interference, and weather during the trials play an effect on our experiment. In the trials, human activity and weather varied significantly for each trial and it did affect the habits of the finches. Parts of trials during our third session were interrupted by big construction activity very close by to the feeders. Sauvajot et al. (1998) suggested small mammals respond strongly to human disturbance-related vegetation changes, while birds showed little or no response. However, the construction evidently did not sit right with the birds, causing some to most likely omit visiting the feeders. This interference led our finches to become more cautious in deciding whether feeding was worth it or not. This is also the case with many other species of birds, not just finches. According to Krabbe (2004), interference competition plays a significant role in whether or not birds will not only feed, but also nest and socialize. During our

first and third sessions, it was overcast, during the third session it was a sunny day and during our final session it was cold and cloudy. Inconsistent weather did inherently lead to different tallies, affecting data.

The presence of natural predators could also have affected some of our data. During our second trial, a bobcat was spotted hunting some rabbits, and that could have frightened the birds. In the first and fourth trials, hawks were seen circling either overhead or nearby, again potentially causing the birds to be scared. Goldfinches have evolved to know which other species present a threat to them and respond accordingly by not staying around (Dunn et. al 1994). Franks and Thorogood (2018) highlight the effect age of the birds had on foraging, which shows older birds are quicker to adapt to a situation in order to optimize their success. Older birds express greater regard for observation of their surroundings and subsequent understanding of the best approach to interact with their surroundings. No one factor alone can be attributed to how birds choose to feed, as they all play a role in that decision as well (Barta et al. 2004, Cueto et al. 2001). Food density could have served as a motivational factor to face risk as two feeders full of seed has remained in the same location for a few weeks. Beauchamp (2009) suggest that bird groups size has a confounding effect with food density in increasing vigilance in birds.

Since each feeder is situated a different distance from the road, construction, forest, etc., we recognized the possibility that the birds already favor a given location, regardless of what our experiment entails. In order to ensure our data has no discrepancies due to a predetermined preference, we alternated which feeder was the control and which was the experimental. For every variable, two trials were conducted in which the feeders were swapped.

In future experiments, we suggest extending the time of each trial from 30 minutes to at least 45 minutes or perhaps even an hour. A lot of our data came within the final 10-15 minutes of each trial, which we thought was due to the birds needing time to get acclimated to us observing them from a distance. We would also suggest a different location, perhaps a spot with less construction. Since the construction affected some days more than others, omitting it from a future experiment would be ideal. Lastly, with a larger time frame to prepare for the experiment, organizing the experiment to take place only on days with similar weather patterns may solidify any findings we have discovered. Since the weather influenced certain bird feeding activity, and subsequently affected our data, having a consistent weather pattern for each session would eliminate that source of error.

When it comes to feeding and avoiding competition, finches balance each as a priority and even express riskier behavior when they feel appropriate, because goldfinches seem to take extra caution giving themselves the best chance of survival (Krabbe 2004). Based on Dunn et al. 1990 and Popp 2010, goldfinches are wise in their choices for food, and who to interact with. They assess their odds against a given variable and use that assessment to their advantage for survival. Our findings at Purchase correlate with such data involving goldfinches elsewhere.

CONCLUSIONS

Purchase College birds exhibited a preference to the unoccupied/control feeder every time compared to the experimental feeder with the prop. This supports one aspect of our hypothesis, however, there is not sufficient enough information to conclude that there is any difference in the level of threat between a “realistic” and “nonrealistic” prop. Our prediction that birds will avoid the more realistic props due to a higher assessed level of threat was falsified by this experiment. With a continuously growing amount of construction and human activity across campus, it’s essential to understand how our interactions with the inhabitants of our local environment affect their day to day life, and what we can do to change these impacts.

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