The Effect of Color and Lighting on the Feeding Habits of Birds

Category: Animal Behavior

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The Research Plan/Project Summary should include the following:

1. **RATIONALE: Include a brief synopsis of the background that supports your research problem and explain why this research is important and if applicable, explain any societal impact of your research.**
2. **RESEARCH QUESTION(S), HYPOTHESIS(ES), ENGINEERING GOAL(S), EXPECTED OUTCOMES: How is this based on the rationale described above?**
3. **Describe the following in detail:**
    a. **Procedures: Detail all procedures and experimental design including methods for data collection. Describe only your project. Do not include work done by mentor or others.**
    b. **Risk and Safety: Identify any potential risks and safety precautions needed.**
    c. **Data Analysis: Describe the procedures you will use to analyze the data/results.**
4. **BIBLIOGRAPHY: List major references (e.g. science journal articles, books, internet sites) from your literature review. If you plan to use vertebrate animals, one of these references must be an animal care reference.**

In recent studies, birds have shown that they may have a preference of colors. It was observed in previous research that frugivorous birds, when taste, nutrition, and accessibility to food sources are equal, often exhibit color preferences. These color preferences in fleshy fruits include Yellow and have little tendency in red and black. However, this data only collected if birds have a preference in the color of the fruit, not on a bigger scale, the feeder. Also, the research was done only on frugivorous birds, birds that feed on fruits, rather than the birds we see in our habitat, granivorous birds(birds that feed on seeds). It is of great importance to learn what colors birds have a preference to so we can add these colors to the environment that we deforestate; to maintain stability in the ecosystem.

It is crucial to identify which colors birds show a preference for. By knowing which colors birds show preferences for, those specific colors may be infused into the infrastructure of the new urban cities humans are building so that the birds do not leave their native land. If the birds are forced out of their natural habitat by deforestation and urbanization, then due to the co-dependent nature of birds in an ecosystem, by them leaving will cause great disruption in not only the ecosystem they are leaving but also the ecosystem they are forced into by them becoming a new invasive species to the new ecosystem. These experiments were done on wild birds of varying species in a non-controlled environment. Therefore, an experiment in a controlled environment would cancel out all of the external factors that may affect the data such as weather, temperature, and light. By controlling these factors, a more concrete data set would help prove the color preference in birds if they had any.

The type of birds used in this experiment will be Zebra Finches. In order to determine whether or not birds show a color preference under controlled conditions, four cages will be set up side by side numbered 3,7,11 and 14. The colors of feeders chosen for this experiment- red, green, clear and brown- will be based off of a previous experiment done to determine the color preference in wild granivorous birds. These same colors will be used to determine if this preference in color is present in all species of birds or just wild birds consisting of many different species. Also, the same colors will be used in this experiment to see if the colors are still preferred in a controlled environment or just wild birds with many external factors. Before any data will be collected, the different color feeders will be set up in the cages to get the birds used to the change from their initial cage set up. Although there are 4 colors being experimented on, only two colors will be put into each cage. The color of the two chosen feeders will be chosen at random and located equidistant from each other in the cage. After a week of the birds growing accustomed to the new feeders, data collection will be initiated. On every alternate day, the feeders will be refreshed with new bird food and then two other colors will be randomly selected again to go in a new cage.

To determine which color is preferred, the mass of the feeders before they were put in the cages will be measured in grams. After exactly two days, the feeders will be taken out of the cage for the mass to be measured again. The difference in the mass on the two day interval will portray how much food was eaten by the bird. The birds will be under these conditions over a period of 14 days and every other day, the feeder's mass will be measured. Another trial will be done by randomizing the order of the cages from left to right to cancel out lighting factors. Every time the data will be collected, the feeders' location, as well as color feeder in the cage will be randomly selected. The birds will be under these conditions over a period of 14 days and every other day, the feeder's mass will be measured. The final factor that will be put into account is the type of lighting. For the first 28 days, the birds will be set up under fluorescent lighting. This lighting's wavelength however is limited to around 480 nm to about 570 nm but birds can see into the ultraviolet spectrum. Therefore, full spectrum lights will be set up for the next trial of data collection. After all data is collected under different conditions, the data will be analyzed using a type three sum of squares analysis was done to see if each factor, the color of feeder, location, and lighting had a statistical significance. Then a two-way ANOVA analysis will be done to compare the mean difference between groups that have been split on two independent variables.

3. NO CHANGES WERE MADE TO ORIGINAL RESEARCH PLAN