

Caching Behavior in Corvids: Cognition and Pattern Recognition

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Abstract

Caching behavior in two corvids, American crow (*Corvus brachyrhynchos*) and western scrub jay (*Aphelocoma californica*) were recorded using motion-activated cameras and direct observations in order to compare behavioral differences between the two species. Investigating bird caching behavior is important in determining the cognitive capacity of each bird species and displaying how these avian species may have adapted to living successfully in urban ecosystems with highly variable food sources. Both species were baited using peanuts. We video recorded how birds selected peanuts to examine potential size or weight preferences specific to either species. After initial observations of caching behavior with untreated peanuts, food dye was applied to peanuts with a mass greater than 2.5g. contained within a group of undyed peanuts with a mass below 1.5g. By varying which group the dye was applied to, it was possible to examine the extent to which corvids were capable of recognizing patterns associated with their food source in order to optimize caching productivity. The ability to rapidly recognize changes and patterns associated with their food sources could allow for rapid adaptation in feeding that provides corvids with a significant selective advantage in urban environments.

Introduction

Questions

- American crows and western scrub jays, being members of the Corvidae family, are closely related and have similar niches. How does their caching behavior differ and do these differences allow Western Scrub Jays to adequately compete with their larger counterparts?
- Do western scrub jays demonstrate the cognitive capacity to recognize patterns that relate to their food sources?
- Western scrub jays are frequently seen picking up and dropping peanuts multiple times before choosing one to cache. What are they determining by doing this?

Hypotheses

- Western scrub jays show similar intelligence to crows and can quickly identify and adapt to the presence or absence of patterns.
- Western scrub jays select the heaviest peanut they can find to maximize the amount of food they can cache each trip.
- Western scrub jays select peanuts that are best shaped for carrying during flight.
- Western scrub jays will associate dyed peanuts with a greater weight and will prefer them over undyed peanuts.+



Baiting Locations and Target Species



Bottom peanuts were dyed red

Banded American crow (*Corvus brachyrhynchos*) on LMU's campus

Drollinger Field baiting site with peanuts



Research Annex baiting platform. Image taken using motion capture camera



Western scrub jay (*Aphelocoma californica*)

Methods

Baiting Procedure

- Half a cup of undyed and half a cup of dyed peanuts were spread out in two clusters approximately 5 feet apart from the each other
- Baiting was performed three times a week throughout all stages of baiting.

Locations

- Motion camera experiments took place at a baiting platform between the LMU Research Annex and North Hall.
- Initial baiting as well as weight sorted and dyed baiting occurred at Drollinger Field.

Time Period

Initial (Unsorted baiting): Week of January 16 - Week of January 30
Sorting with heavy dyed: Week of February 6 - Week of February 13
Sorting with light dyed: Week of February 20 - Week of February 27

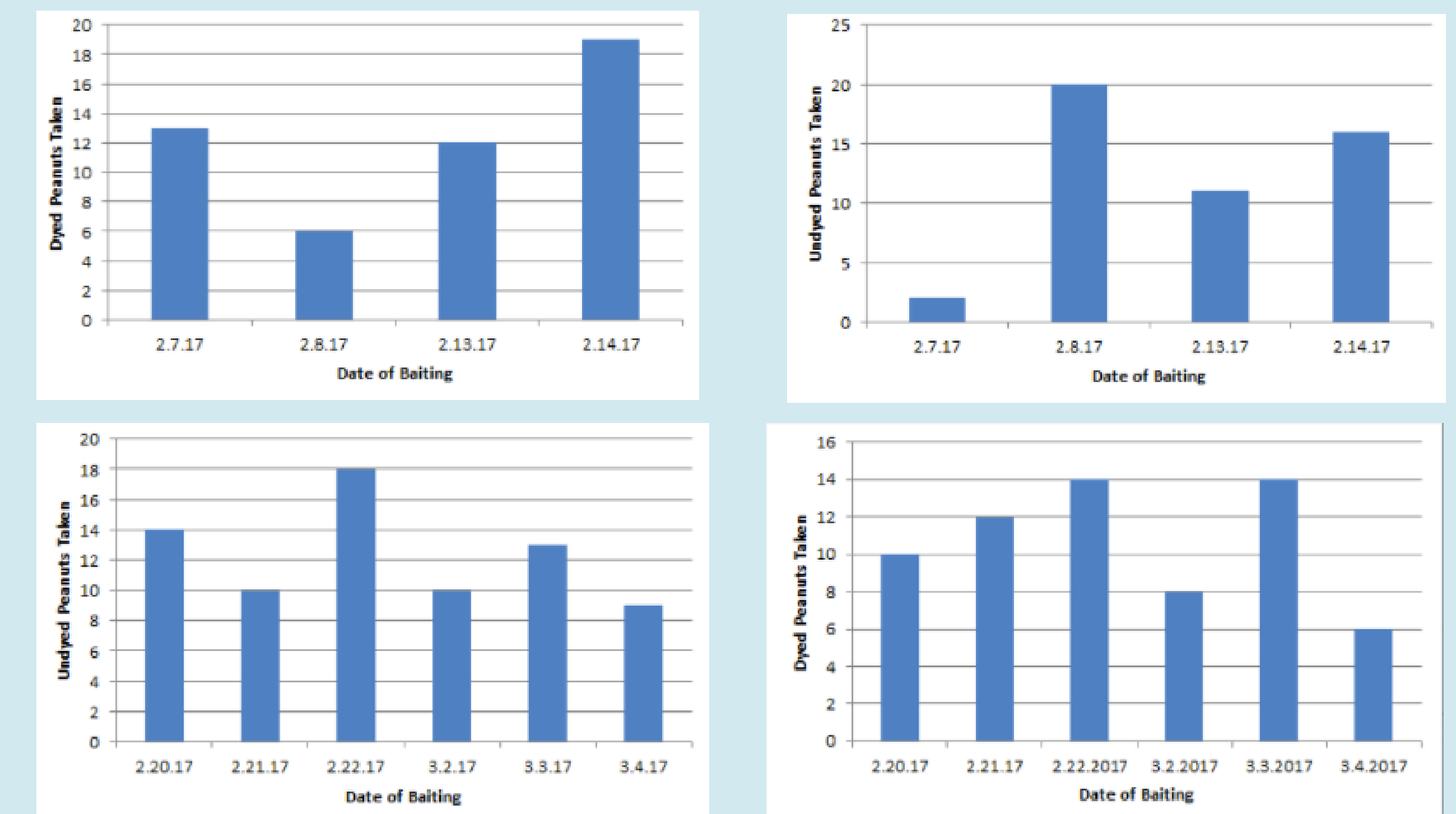
Motion Capture Camera

- A motion activated camera along with iSpy surveillance software were used to remotely monitor a platform baited with peto observe initial behaviors of two corvid species.

Peanut Sorting and Dyeing

- Peanuts were sorted by weight, using the scheme:
 - Heavy peanuts > 2.5g, Light peanuts < 1.5g
- Peanuts were dyed red by soaking them in a solution of red food coloring for a minimum of 24 hours.

Results



The number of peanuts grabbed by western scrub jays, sorted by both weight and time is shown above.

- Weak evidence is provided for adaptation to and exploitation of the baiting patterns by western scrub jays.
- It remains unclear why western scrub jays are observed picking up and dropping peanuts many times before selecting one.
- There was no definitive trend in the selection of peanuts between heavy and light peanuts or dyed and undyed peanuts.

Discussion

- Preliminary results may suggest that western scrub jays were able to identify patterns in peanut dyeing.
- Weak support of our hypothesis that western scrub jays would prefer dyed peanuts may indicate:
 - Too few data points to definitively show a trend in peanut preference.
 - Inadequate timeframe for the implemented pattern to be adapted to.
 - A different criteria for selection of peanuts than weight
- Baiting conditions varied widely during the period of study, and factors such as rain and the presence or absence of American crows at the baiting site may have altered the behavior of western scrub jays at the site drastically from one baiting session to the next.
- Comparison of the number of heavy vs. light peanuts grabbed may not be useful, as the number of peanuts per pile was not equal.
- It may be necessary to determine if the population of western scrub jays visiting the site is consistent.
- Future experiments may attempt to determine the criteria by which western scrub jays select what they cache.

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