

Keep Calm and Carry On:

Behavioral Frequency and Dominance Hierarchy in California Condors

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HYPOTHESIS

California condor social hierarchy will be reflected in the frequency in which certain behaviors are performed by each individual. We expect higher ranked individuals to engage more frequently in dominant/aggressive behavior than individuals lower in the hierarchy and lower ranked individuals to evade aggressive behavior more often.

FINDINGS

- Frequency of selected behaviors is correlated with observed dominance hierarchy
- Adjusted dominance rank differs from rank based on age for middle ranked individuals
- Social alliances may influence hierarchy order



INTRODUCING THE CALIFORNIA CONDOR

Due to habitat destruction, as well as poaching and lead poisoning from fragmented bullets, the California condor is categorized as critically endangered. However, efforts to save the species have been implemented due to the vital role they play in the process of decomposition in the ecology of Northwestern N. America. Lacking a sense of smell, they find food by spotting carcasses visually from incredible altitudes, picking apart the remains after other carnivores and scavengers have had their fill. During feeding, the dominance hierarchy can often be determined by which individual gets first pick of the remains.



Oregon Zoo Condors

42 – Hatched April 11, 1985 (30 years)

39 – Hatched April 22, 2007 (8 years)

61 – Hatched May 1, 2008 (7 years)

91 – Hatched May 24, 2008 (7 years)

The Prisoner – Hatched April 29, 2009 (6 years)

BEHAVIORAL SAMPLING

Our research was conducted from the lower observation point of the condor enclosure at the Oregon Zoo. We used one-zero sampling techniques during 8 sessions, each of which lasted 30 minutes.



DATA ANALYSIS

We calculated the total frequency of each observed behavior. Selected dominance behaviors were ranked and compared to a predicted hierarchy based on age.

Ethogram

- Aggression** - Persistent pecking, aggressive wing-flapping, or encroachment toward another individual's spot on the perch.
- Preening** - Scraping feathers, head down or under wing.
- Perching** - Motionless standing/sitting on a perch.
- Wing Stretch** - Wings fully extended for a prolonged time (i.e. longer than necessary for preparing for flight)
- Unprovoked Flight** - Flight from one perch to another perch or the ground.
- Provoked Flight** - Flight from one perch to another perch or the ground, response to aggressive behavior by another individual.
- Ground** - Walking or investigating the ground.
- Feeding** - Actively pecking, tearing, and consuming food.
- Out of Sight** - Condor not visible from observer vantage point.

RESULTS

Frequency of selected behaviors by condor



Predicted and experimental dominance rank values

Individual	Predicted Rank by Age	Aggression Rank	Unprovoked Flight Rank	Provoked Flight Rank	Wing Stretch Rank	Aggregate Dominance Rank	Adjusted Dominance Rank
42	1	3	2.5	1	2	2.125	1.5
39	2	4	2.5	5	3	3.625	4
91	3	1	4	2.5	1	2.125	1.5
61	4	2	1	4	4	2.75	3
The Prisoner	5	5	5	2.5	5	4.325	5

The results support the hypothesis that behavioral frequency reflects status in the condor social hierarchy.

The oldest and youngest individuals occupied the highest and lowest ranks, respectively. The three birds in the middle of the hierarchy did not follow the ranking system based on age.

FUTURE RESEARCH

Further studies on condor behavior patterns and social hierarchy should use smaller increments of time for sampling in order to get more nuanced information about the frequency of specific behaviors and the overall condor time budget. More emphasis should be placed on alliances between condors to see the extent to which this affects the social hierarchy.

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