



SIBLING AGGRESSION IN A NEOTROPICAL RAPTOR, THE BLACK-CHESTED BUZZARD-EAGLE (*GERANOAEETUS MELANOLEUCUS*): A FIRST REPORT FOR CHILE

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Abstract · Sibling aggression is an agonistic behavior among chicks of the same nest that occurs soon after hatching. Despite its occurrence being well-documented in several species of raptors, information available for Neotropical species is scarce. During the breeding season of 2013–2014, we conducted behavioral observations on the nests of two pairs of the Black-chested Buzzard-Eagle (*Geranoaetus melanoleucus*) in central Chile. Brood sizes for these nests were two and three chicks. Around 5–7 days after hatching, the first sibling aggressions were observed in both nests. They were characterized by repetitive vigorous attacks by both, older and younger chicks. We observed this behavior until the chicks were 20–25 days old, but no brood reduction occurred. This work represents the first detailed record of sibling aggression in a diurnal raptor in Chile.

Resumen · **Agresión entre hermanos en una rapaz Neotropical, el águila (*Geranoaetus melanoleucus*): un primer reporte para Chile**

La agresión entre hermanos es un comportamiento agonista que ocurre entre pichones de la misma nidada poco tiempo después de haber eclosionado. A pesar de que su ocurrencia está bien documentada en varias especies de aves rapaces, su conocimiento en el neotrópico es limitado. Durante una temporada reproductiva, observamos los nidos de dos parejas de águilas (*Geranoaetus melanoleucus*) en la zona central de Chile. El tamaño de la nidada fue de dos y tres pichones. Luego de 5–7 días posteclosión, las primeras agresiones entre pichones se observaron en ambos nidos. Estas agresiones se caracterizaron por ser ataques vigorosos y repetitivos, tanto por los polluelos mayores como por los más jóvenes. Las agresiones se extendieron hasta 20–25 días posteclosión, aunque sin reducción de la nidada. Este trabajo representa el primer registro detallado de la agresión entre pichones en un ave rapaz diurna de Chile.

Key words: Black-chested Buzzard-Eagle · Chile · Neotropical raptors · Siblicide · Sibling aggression

INTRODUCTION

Sibling aggression is a behavior characterized by a dominant relationship between siblings that may result in the survival and/or reproduction of the aggressor at the expense of the subordinate siblings (Morandini & Ferrer 2015). Depending on the intensity of these aggressions, the affected siblings frequently die from injury, starvation, or by falling from the nest in an attempt to avoid their aggressor (Godfray & Harper 1990), in which case the behavior is termed siblicide (Mock et al. 1990).

In raptors, sibling aggression is common in large eagles (Newton 1979, Edwards & Collopy 1983) and has been recorded for several genera, such as *Aquila*, *Clanga*, *Haliaeetus*, *Hieraetus*, and *Stephanoaetus* (Meyburg 1974, Steyn 1975, Edwards & Collopy 1983, Taylor et al. 1999, Hernández-Matías et al. 2016). For South American raptors, sibling aggression, or siblicide, has been rarely reported. To the best of our knowledge, reports of this behavior in South American raptors have only been made for the Black-chested Buzzard-Eagle (*Geranoaetus melanoleucus*; De Lucca & Saggese 1995), the Swallow-tailed Kite (*Elanoides forficatus*; Gerhardt et al. 2009), and the Roadside Hawk (*Rupornis magnirostris*; Panasci 2012). Additionally, siblicide has been mentioned for the Harpy Eagle (*Harpia harpyja*; Simmons 1988), but there is no mention of siblicide behavior in the cited articles (see Brown & Amadon 1968, Rettig 1978).

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Table 1. Evidence of sibling aggression and brood reduction in Black-chested Buzzard-Eagle studies. AR= Argentina; CH= Chile; (a) Jiménez & Jaksic (1990); (b) Hiraldo et al. (1995); (c) De Lucca & Saggese (1995); (d) Pavez (2001); (e) Villegas-Davies et al. (2018); (f) This study. *Authors did not evaluate sibling aggression or brood reduction.

Number of nests	Median clutch size (range)	Sibling aggression	Nests with brood reduction	Cause of brood reduction	Country (sources)
4	2	Not reported*	None	–	CH (a)
3	2 (2–3)	Not reported*	Not reported*	–	AR (b)
5	2.5 (2–3)	Observed	3	Sibling aggression	AR (c)
3	2 (2–3)	Not observed	1	Predation by dogs	CH (d)
3	2 (2–3)	Not reported*	None	–	AR (e)
2	2.5 (2–3)	Observed	None	–	CH (f)

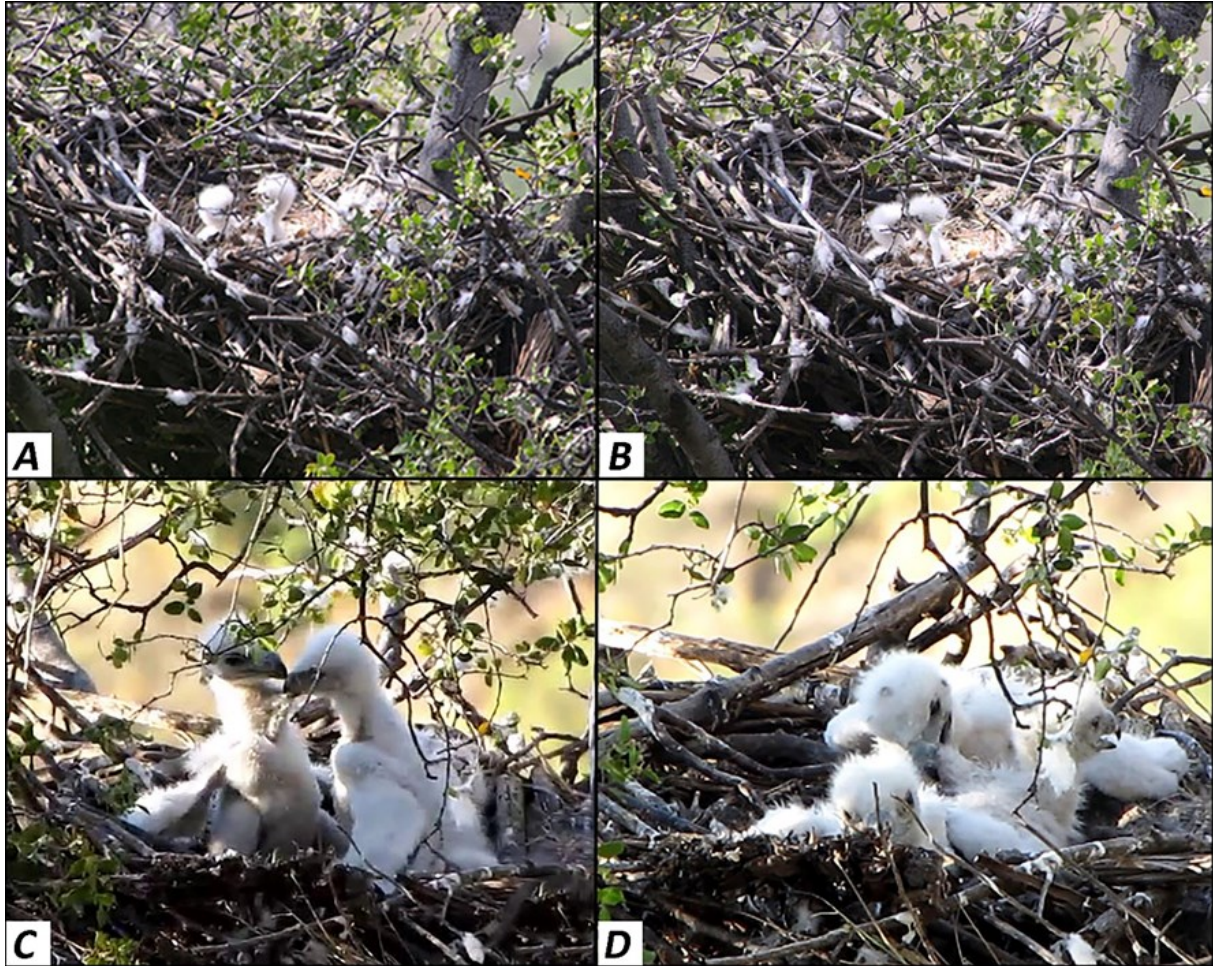


Figure 1. First attacks between chicks of Black-chested Buzzard-Eagles were recorded when approximately 5–7 days of age (A–B). Between days 10–14 post-hatching, aggressive behavior was more frequent and intense (C–D).

The Black-chested Buzzard-Eagle is one of the most common and largest raptors inhabiting tropical and temperate areas of South America (Jiménez & Jaksic 1990), distributed from Venezuela to Tierra del Fuego on both sides of the Andes (*G. m. australis*), and from eastern to southern Brazil and through Paraguay, Uruguay and northeastern Argentina (*G. m. melanoleucus*) (Thiollay 1994). In Chile, it is distributed virtually throughout the whole territory, occupying both mountain ranges (Andean and Coastal) from sea level up to c. 2500 m a.s.l. (Jiménez & Jaksic 1990). However, and even though it is one of the most studied raptor species in Chile (Raimilla et al. 2012), sibling aggression has not been previously reported in this country. Here, we present evidence of the scarcely recorded sibling aggression in South American raptors and report for the first time such behavior in the Black-chested Buzzard-Eagle for Chile. In addition, we briefly discuss our findings with reference to sibling aggression in

raptors in general, and Black-chested Buzzard-Eagles in particular.

METHODS

During the breeding season of September 2013 to January 2014, we made observations on two nesting pairs of Black-chested Buzzard Eagles in central Chile. One nest (N_1) was observed in Panul Hill (33°32' S, 70°31' W), located at 1,300 m a.s.l. The second nest (N_2) was observed in Calera Hill (33°40' S, 70°48' W), located at approximately 600 m a.s.l. Both nests were built on Quillay (*Quillaja saponaria*) trees at c. 10 m above the ground. We visited each nest on 14 different days between the egg laying stage (20–25 September 2013) and the nestling period (late October 2013 to early January 2014), for a total of 144 h of observation per nest (median: 6 h/day). The following information was registered at each

nest: clutch size, estimated age of chicks when sibling aggressions were observed, number and duration of aggression events during each visit, and if brood reduction occurred as result of sibling aggression. Observations were made from a birdwatching hide located 20 m from the nests and using 10 x 42 binoculars. In addition, we reviewed the evidence of sibling aggression by Black-chested Buzzard-Eagles nestlings in the literature.

RESULTS

In N_1 , the clutch size consisted of three eggs, and chicks hatched between 25 and 28 October (brood size = 3; hatching interval c. 48–72 h). In N_2 , the clutch size was two eggs, and chicks hatched between 21 and 23 October (brood size = 2; hatching interval c. 48 h). During the 14 days of observation between 30 October and 25 November, 22 aggression events were registered: 14 by nestlings in N_1 and 8 for those in N_2 , with a mean overall duration of 38.6 ± 11.4 s (range = 30–60 s) per event. In both nests, the first aggression event was observed between 5–7 days after hatching and consisted of brief and weak pecks (Figures 1A, 1B). During these early events, attacks were initiated either by the older or the younger chicks. The intensity of the attacks by the older chicks increased at 10–14 days old and were characterized by vigorous aggressions directed to the head, neck, and back of the smaller nestlings (Figures 1C, 1D). In N_1 , aggression between the first and the second chick was more intense and frequent than aggression involving the third hatched chick. Aggressions were observed up to day 20–25 after hatching in both nests. Finally, in both nests, all chicks survived and initiated fledging flights about 60–65 days after hatching.

A summary of the main observations related to sibling aggression in Black-chested Buzzard-Eagles is shown in Table 1.

DISCUSSION

We observed sibling aggression by chicks of Black-chested Buzzard-Eagles during the first half of the nesting period, but no brood reduction occurred. A detailed review of this phenomenon, including hypotheses, is given by Morandini & Ferrer (2015). Recent evidence suggests that the intensity of this behavior in accipitrid raptors is associated with a trait syndrome that includes a large body size, long breeding cycles, small clutches and, consequently, a slow life history pace (Redondo et al. 2019). Thus, sibling aggression in long-lived raptors could be the result of strong selection by competitive offspring that maximizes post-fledging survival and reproductive success irrespective of food scarcity (the offspring quality hypothesis; Simmons 1988).

The Black-chested Buzzard-Eagle fits the premises of the offspring quality hypothesis (Simmons 1988). They are large raptors (mean weight = 2.0 kg; range = 1.3–3.0 kg; Basso et al. in press) with deferred maturity (acquiring definitive adult plumage in c. 4 years; Seipke 2007), a small clutch size of 2–3 eggs (Table 1), and are relative long-lived (Saggese et al. 2018). In addition, although we did not estimate the rate of food provisioning, the successful fledging of all nestlings in both nests recorded did not suggest food scarcity in our nests.

This report of sibling aggression in Black-chested Buzzard-Eagles confirms that a previous observation in southern Patagonia, Argentina (De Lucca & Saggese 1995) was not an isolated phenomenon. More likely, our observations suggest that it may be an underreported behavior in other studies (Schoonmaker 1984, Jiménez & Jaksic 1990, Hiraldo et al. 1995, Pavez 2001, Salvador et al. 2008, Villegas-Davies et al. 2018). Thus, detailed studies on time activity budget and close observation of nesting pairs and chicks are needed to further characterize this behavior and understand its causes in Black-chested Buzzard-Eagles. The information presented here may serve as a baseline for future studies related to the natural history and ecology of diurnal raptors, not only from Chile but also from the Neotropics, considering that most Neotropical raptors remain understudied (Saggese 2021).

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