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LETTERS

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TALON-GRAPPLING AND CARTWHEELING OF HOODED VULTURES IN SOUTH AFRICA

CAMPBELL MURN[1]
Hawk Conservancy Trust, Andover, Hampshire, SP11 8DY, UK
and
School of Biological Sciences, University of Reading, Berkshire, RG6 6AS, UK

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Talon-grappling and cartwheeling are mid-flight physical interactions between raptors, characterized by two birds locked together by their talons and spinning as they fall (Farquhar et al. 1994). These flights are considered to be primarily aggressive interactions between territorial birds (Simmons and Mendelsohn 1993, Raimilla et al. 2015). However, cartwheeling is not always related to aggression and is sometimes associated with food transfers (Kitowski 2001), courtship (Simmons and Mendelsohn 1993), or as a prelude to copulation (Borello and Borello 2004, Murn et al. 2009).

In-flight interactions between Hooded Vultures (*Necrosyrtes monachus*) have been reported only rarely. One such interaction, called "tumbling," involves two birds flying together, one above the other, with the upper bird extending its legs and "falling" onto the lower bird (Mundy et al. 1992). Ferguson-Lees and Christie (2001) suggest that this behavior involves members of a pair, but Mundy (1982) considers the behavior agonistic, even though the birds do not appear to make contact during these tumbling displays. Here I describe three instances of in-flight interactions between Hooded Vultures that involved physical contact (talon-grappling) and cartwheeling.

On 7 May 2008 at 1215 H in Kruger National Park, South Africa, adjacent to the Sabie River (24°57.90′S, 31°44.53′E), two adult Hooded Vultures were observed flying at approximately 80–100 m above the ground. The birds were approximately 300 m from me, circling slowly and did not appear to be headed in any particular direction. After approximately 5 min, the flight pattern of the vultures changed as they altered course and began to travel directly southeast, toward my observation position. Looking to where the vultures were headed, I observed two other adult Hooded Vultures flying in the same manner toward the first two birds. The four birds flew directly to engage with each other and, once together, began to circle in a tight formation <50 m away from my position. The faces of all four birds were clearly visible and showed a deep pink color.

On three occasions two birds separated from the circling pattern, made contact with each other, locked talons and cartwheeled downward for 30–50 m before separating. These two vultures then regained height to circle in a tight formation again with the other two vultures. On at least the first occasion, this behavior involved one bird from each of the initial pairs; subsequently it was not possible to distinguish individual birds. From when the first pair of birds was seen, the entire observation lasted for approximately 12 min, after which the four birds disengaged from the circling pattern and drifted away in groups of two. There was no sign of pursuit by any of the birds.

At 0820 H on 11 September 2013 near the same location (24°58.03′S, 31°45.53′E) and adjacent to the Sabie River, the same behavior was observed over the course of 8–10 min from approximately 200 m away: four adult Hooded Vultures approached each other in pairs, formed a tight circling group, and on two occasions two birds detached from the group of four, locked talons and cartwheeled from approximately 100 m down to 50–60 m above ground level. Between the first and the second cartwheeling, the vultures regained some height and resumed circling together in a tight formation of four birds. After the second cartwheeling interaction, the four vultures flew away from each other in groups of two and were not observed to interact further.

A third instance of the same behavior, also involving four adult Hooded Vultures, occurred at 1201 H on 20 September 2018 near the same location (24°58.05′S, 31°45.17′E). In this instance the four Hooded Vultures were first seen approximately 450 m away from the observation point, circling together in a tight formation several hundred feet above the open riverbed. After being observed circling together for <1 min, two vultures locked talons and cartwheeled downward to about half their initial height above the riverbed. As these two vultures stopped

[1] Email address: campbell@hawkconservancy.org

cartwheeling and disengaged from each other, the other two vultures drifted downward to fly in the same airspace for a few seconds, before the four vultures flew away from each other in groups of two.

These three instances of cartwheeling behavior took place <1.3 km apart from each other, but were separated in time by more than 10 yr. Although Hooded Vulture nests in the Kruger National Park area can be spaced at a distance of approximately 1.2 km apart (Monadjem et al. 2016), and adult Hooded Vultures have been observed and recorded living in the same area for several years (Roche 2001), there has been no suggestion that Hooded Vultures are territorial. In fact, Hooded Vultures sometimes breed in loosely aggregated colonies with nests <50 m apart (Mundy et al. 1992). However, given that talon-locking and cartwheeling are often associated with aggressive and/or territorial behavior (Simmons and Mendelsohn 1993), the three incidents described above raise the possibility that these interactions are agonistic and may reflect territorial behavior of Hooded Vultures in the Kruger National Park area.

Territorial defense behavior by Hooded Vultures in relation to food is unexpected because food resources within Kruger National Park are spatially and temporally random and likely to be abundant (Monadjem et al. 2018). For example, at the same time as the second (September 2013) observation, there was a lion (*Panthera leo*) kill of a giraffe (*Giraffa camelopardalis*) approximately 300 m from where the birds interacted. At that carcass, three other Hooded Vultures (all juveniles) and numerous African White-backed Vultures (*Gyps africanus*) were perched and presumably waiting for an opportunity to feed. Thus, the in-flight interactions described above are not easily explained in terms of food availability because the birds involved were not near the giraffe carcass, nor did they visit it soon afterward. If the in-flight interactions described here were related to territorial defense, the May 2008 interaction could be interpreted as territorial behavior of a pair at the start of nesting season. The September interactions could be related to territory defense if territorial value is related not to carcass availability but access to other resources along the river such as pools with fish and amphibians.

Another published incident of talon-grappling in Hooded Vultures (Barry 1998) described two birds locking talons and tumbling twice. The three in-flight interactions described here seem similar to those detailed by Barry (1998). Despite the lack of reporting or descriptions of these behaviors in species' accounts for the Hooded Vulture, it is possible that talon-locking and cartwheeling are not uncommon behaviors in this species and simply have not been reported.

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