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AGONISTIC "WHIRLING" BY ZONE-TAILED HAWKS

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Aerial "whirling" by raptors with their talons locked has been described for various species and given different interpretations. Raptors "whirl" when, in flight, one drops on another with feet extended and toes open, and upon close approach, the other rolls over on its back and extends its feet upwards, whereupon they lock feet and descend in the whirling fashion depicted in Brown and Amadon (1968: 100, Fig. 27). (Most encounters of this kind, however, do not result in whirling, but just touching and parting.) Brown and Amadon (1968) reported whirling as courtship for *Haliaeetus* eagles and the Upland Buzzard (*Buteo hemilasius*). Springer (1979) likewise interpreted this as courtship behavior for a pair of Red-tailed Hawks (*B. jamai-censis*). Craig et al. (1982) and Kilham (1981), however, reported it as agonistic behavior between breeding adults and intruders for the Northern Harrier (*Circus cyaneus*) and Red-shouldered Hawk (*B. lineatus*), respectively. Newton (1979) observed whirling encounters between Eurasian Kestrels (*Falco tinnunculus*) and reported on encounters between Peregrine Falcons (*F. peregrinus*), Golden Eagles (*Aquila chrysaetos*), and Common Buzzard (*B. buteo*), all of which were interpreted as agonistic.

Hubbard (1974) observed and reported this behavior for the first time in the Zone-tailed Hawk (*B. albonotatus*), but only speculated as to its function in that encounter. I witnessed an encounter between the adult male of a breeding pair and an intruding adult of this species which resulted in aerial whirling on 29 July 1983. This happened at approximately 11:00 while I was watching a family of these hawks in Santa Cruz Co., Arizona. The single young had fledged and was perched on a hillside about 100 m from the cottonwood tree nest. It called repeatedly and was easy to observe from the road. The adult female was particularly aggressive, even for this species (she dived at me and almost struck me) presumably because I was within 10 m of the fledgling. Initially the adult male flew low, slightly above the female, but did not attempt to dive at me. I could identify the male by his smaller size and different stage of primary molt. (Breeding male raptors

usually molt flight feathers a month or more later than their mates, e.g., see Newton 1982.) A third adult joined the pair flying at the altitude of the male. I believe the intruder was also a male because his size and stage of molt were the same as the territorial male's. The resident male and the intruder began vocalizing, flying with exaggerated deep wingbeats and gaining altitude. When they had risen to about 300 m, the upper one dived at the lower one, which rolled over on its back and presented talons. They locked talons and began whirling as described above. They fell for about 2 s, losing considerable altitude. After they parted, both birds continued soaring and vocalizing. A minute or two later, one of them, presumably the intruder, glided away to the east. Both ceased calling when this happened. The local male continued soaring over his territory. Throughout this encounter, the adult female continued to dive at me, making seven or eight stoops in all. The fledgling continued his calling, which I interpreted as food begging.

Thus, aerial talon-grappling or whirling is clearly agonistic at times. It remains to be reported whether this behavior is more frequent and widespread than its use in courtship, although an element of antagonism exists in the early stages of courtship.

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