

Supplemental Data:

Type of threat influences postconflict allopreening in a social bird

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Supplemental Experimental Procedures

Study Site and Species

Fieldwork was carried out near Morgan's Bay (32°43'S, 28°19'E), Eastern Cape Province, South Africa on a colour-ringed population of green woodhoopoes, a cooperatively breeding bird species. Green woodhoopoe groups at the study site defend territories in thickly forested riverine valleys throughout the year [S1]. Because territories are generally arranged linearly along river courses, and forested areas are separated by open grassland, which is rarely used by the birds, each territory tends to border only two others directly [S1]. Disputes between groups occur when one trespasses into the territory of another, or when members of two groups meet along a common territory boundary [S2]. Competing groups may be up to 30 m apart and obscured from one another by thick vegetation, making acoustic cues more useful than visual ones. Contests therefore involve raucous vocal displays, with all individuals rocking back and forth while cackling loudly [S2]. One individual starts producing a resonant 'kek-ek-ek-ek' call, at a rate of ca. 12 keks/s, and then the other adult group members join in, resulting in a "rally" [S3]. During contests, rival groups tend to produce rallies alternately, for anything up to 45 mins [S4].

Preening woodhoopoes search and stroke feathers with soft jabs of the bill and sometimes run the feathers through the bill [S5]. Allopreening was defined as the behaviour whereby one woodhoopoe brought its bill into firm contact with the feathers of another individual in a preening motion. Because juvenile woodhoopoes rarely allopreen [S5], I only consider interactions between adult individuals (>11 months since fledging; nestling period lasts 1 month; [S3]); group sizes therefore refer to the number of adult group members. Juveniles were identified by their predominantly black bills [S3]; adults could be sexed from their bill length [S6] and vocalisations [S7]; and dominance status was established by watching displacement activity during group foraging, when "the dominant pair" (the putative breeding pair) consistently displace nonbreeding "subordinate helpers" [S6]. The composition of each

group, as well as each group member's dominance status, remained the same between playback trials, allowing matched comparisons of allopreening rates.

Playback Experiment

Playback loops were created in Cool Edit 96 (Syntrillium Software Corporation, Scottsdale, AZ, U.S.A.) by editing suitable recordings of rallies from the 28 groups in the study population. Recordings were made using a Sennheiser MKH416T microphone (with windshield) and a WM-D6C Sony Professional Walkman, and were then digitised (44 kHz, 16 bits). No loop was used more than once, thus avoiding pseudoreplication. Twelve groups (mean \pm s.e.m. group size = 3.3 ± 0.3 , range 2-5) having at least one adjoining neighbour were each presented with two trials. One trial consisted of a rally from a neighbouring group on the expected territory boundary. The other trial consisted of a rally from a strange group (one from at least three territories away from the focal group), of the same size and sex ratio as the neighbouring group, and played on the same boundary as the first trial (see [S8]). Both playback trials to a particular group were of the same duration (mean \pm SD = 6.8 ± 1.1 s, range 5.7–9.8 s, depending on group size [S2]). Trials were conducted from March to May in 2000. By this period, the breeding season had finished and all group members tended to move around the territory together. The same group was presented with both trials at approximately the same time of day; the order of trial presentation was randomised; and playbacks to the same group were always separated by 7–14 days to minimise habituation.

In each trial, a single rally was played from a Sony SRS-A35 loudspeaker placed 2 m high in a tree about 20 m from the trial group. Only one speaker was used because group members tend to rally from within 1 m of one another [S2]. Groups were required to be foraging for at least 5 min before the start of the playback, and trials were only conducted when there had been no natural intrusion in the previous hour. In all trials, the focal group rallied in response to the playback (see [S8]). I recorded allopreening events *ad libitum* in the hour before and the hour after a playback trial. Birds preening others were classified as “donors”, while those being preened were the “recipients”. An allopreening bout focused on either regions of the recipient's body that were inaccessible to itself (i.e. the head and neck, termed the “head”) or regions that were theoretically accessible to itself (i.e. anywhere lower than the neck, termed the “body”). An allopreening bout was considered finished whenever one or both individuals moved away from one another, or when no allopreening had occurred for 30 s; subsequent allopreening events between the same two individuals were classified as separate events.

Data Analysis

Repeated-measures ANOVAs were used for all analyses because each group received both playback trials and the data were normally distributed. When comparing both the allopreening donation and receipt of the dominant pair and subordinate helpers, mean values for each category of individual were used from each group. All statistical tests were two-tailed, were deemed significant at $p < 0.05$ and were conducted in Minitab (13th edition, Coventry, UK).

Supplemental References

- S1. Radford, A.N., and du Plessis, M.A. (2004). Green woodhoopoe territories remain stable despite group-size fluctuations. *J. Avian Biol.* 35, 262–268.
- S2. Radford, A.N. (2003). Territorial vocal rallying in the green woodhoopoe: influence of rival group size and composition. *Anim. Behav.* 66, 1035–1044.
- S3. Ligon, J.D., and Ligon, S.H. (1978). The communal social system of the green woodhoopoe in Kenya. *Living Bird* 17, 159–197.
- S4. Radford, A.N., and du Plessis, M.A. (2004). Territorial vocal rallying in the green woodhoopoe: factors affecting contest length and outcome. *Anim. Behav.* 68, 803–810.
- S5. Radford, A.N., and du Plessis, M.A. (2006). Dual function of allopreening in the cooperatively breeding green woodhoopoe, *Phoeniculus purpureus*. *Behav. Ecol. Sociobiol.* 61, 221–230.
- S6. Radford, A.N., and du Plessis, M.A. (2003). Bill dimorphism and foraging niche partitioning in the green woodhoopoe. *J. Anim. Ecol.* 72, 258–269.
- S7. Radford, A.N. (2004). Voice breaking in males results in sexual dimorphism of green woodhoopoe calls. *Behaviour* 141, 555–569.
- S8. Radford, A.N. (2005). Group-specific vocal signatures and neighbour-stranger discrimination in the cooperatively breeding green woodhoopoe. *Anim. Behav.* 70, 1227–1234.