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Animal Behavior: Conflict Management Is for the Birds

Conflict is a fact of life in social species. New data from birds enhance our understanding of how and why evolution has favored mechanisms to resolve disputes and manage conflicts.

Joan B. Silk

In many mammalian species, including our own, sociality is the norm. Animals may be better off in groups because they are safer from predators, better able to defend food resources, or profit from sharing information. But these advantages do not necessarily produce social harmony. Noisy squabbles over food, mating opportunities, grooming partners, maternal attention, resting spots and social status punctuate the day. Clearly, animals that depend on being together may need some help in getting along.

A growing body of evidence from an increasing range of animal taxa suggests that evolution has provided animals with behavioral tools to resolve conflicts [1]. For example, after two female baboons fight, the winner may approach the loser and grunt softly to her [2]. The grunt signals her intention to stop fighting, and enables her to interact peacefully with the female she has just defeated [3]. Similar kinds of 'reconciliatory' events have been documented in a number of primate species [1], as well as spotted hyenas [4,5], domestic goats [6] and bottle-nosed dolphins [7]. In this issue of *Current Biology*, Seed *et al.* [8] report data that extend the study of conflict resolution to birds. The work focuses on rooks, which form pairs within larger flocks. Rooks virtually never squabble with their partners, but they do become embroiled in conflicts with

other members of their flocks. When this happens, rooks do not reconcile with their former opponents.

The absence of reconciliation in rooks provides some insight about its function. In monkeys, conflict is evidently stressful. After monkeys fight, their heart rates rise and remain elevated for several minutes. If monkeys reconcile, their heart rates return to baseline levels more quickly than they otherwise would do [9]. Conflict may also have long term effects on the quality of social bonds. Following the lead of Frans de Waal and colleagues [10], most researchers have embraced the idea that reconciliation helps former opponents to repair valuable social relationships that have been disrupted by conflict. The importance of these relationships favors mechanisms to preserve them [11]. Thus, female gorillas may reconcile disputes with the silverbacks of their groups, but not with other females, because their relationships to protective silverbacks are more valuable than their relationships to other females [12]. Similarly, female monkeys are more likely to reconcile conflicts with close associates than with other members of their groups [13]. Seed *et al.* [8] speculate that rooks may not reconcile with flockmates because these relationships have relatively little impact on their well-being. Their most valuable partners are their mates with whom they live in near perfect harmony.

Although this explanation for reconciliation seems intuitively appealing, it is not clear that it is correct. We do not have compelling evidence that conflict has negative long-term effects on social bonds in primates or other taxa, or that reconciliation is needed to maintain close bonds. In fact, rates of conflict are often quite high among pairs of females who have very strong bonds, such as sisters. We also know that the same pairs of monkeys fight and reconcile, over and over again. It seems reasonable that the efficacy of reconciliation would decline after repeated offenses, unless monkeys have very short memories or very forgiving natures. Neither seems very plausible.

It is possible that reconciliatory gesture, like the baboon's grunt or the chimpanzee's kiss, may be more like a cease fire than an armistice. These gestures may be predictive signals which indicate that the caller does not intend to resume the conflict [14]. This might be useful because conflicts have clear beginnings, but quite ambiguous endings. Uncertainty about whether a conflict will flare up again is thought to contribute to monkeys' elevated heart rates after conflicts [15]. If the aggressor wants to be groomed by her former opponent, handle her infant or feed nearby, it might be important to reassure the victim that she won't resume fighting. Playback experiments show that reconciliation does reduce baboons' concerns about renewed aggression from former opponents, and make victims more likely to approach and initiate interactions with their former aggressors [1,16]. Thus, animals may use reconciliation as a means to an immediate end. If this reasoning is correct, then rooks may not reconcile with flock

members because they are not motivated to interact with them, and have no need to establish a truce.

Although rooks do not reconcile after conflicts, they do perform affiliative interactions, such as bill-twining, with their partners after conflicts. Similar types of events have been observed in great apes, but are largely absent in other species [17]. Primatologists use the term 'consolation' for third-party post-conflict affiliation, and hypothesize that it relieves distress produced by conflict [10]. The occurrence of consolation in chimpanzees, but not in other primates, is sometimes linked to chimpanzees' capacity for empathy and knowledge of others' minds [17]. Interestingly, corvids display striking convergence with chimpanzees in some aspects of their cognition, including their ability to make use of what others know in competitive settings [18].

The significance of this convergence is complicated by the fact that there is no evidence that third-party post-conflict affiliation actually provides consolation. In a new study of captive chimpanzees, Korski and Sterck [19] show that reconciliatory behavior between former opponents reliably reduces victims' distress. But affiliation by individuals who were not involved in the original conflict does not have the same effect, even when it is initiated by favored partners, such as close kin.

Again, it may be important to consider alternative, and perhaps less anthropomorphic, explanations. Seed *et al.* [8] suggest that third party post-conflict affiliation might reinforce bonds with allies. If so, we might predict that pair-bonded primates, like gibbons and titi monkeys, would engage in post-conflict affiliation with their mates after conflicts with outsiders. This prediction could be tested in pair-bonded primates, and in the many species of pair-bonded birds.

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Behavioral Genomics: A, Bee, C, G, T

Honeybees, termites and ants occupy the 'pinnacle of social evolution' with societies of a complexity that rivals our own. The sequencing of the honeybee genome will provide a strong foundation for studying the genetic basis of complex social behavior.

**Yannick Wurm, John Wang
and Laurent Keller**

*Go to the ant, thou sluggard;
consider her ways, and be wise*
Proverbs 6:6

This well-known Bible verse appropriately illustrates the long fascination of human beings for the complexity of social insect colonies and the industrious nature of their workers. The major organizing principle of ant, bee and termite societies is reproductive division of labor whereby one or

a few individuals, the queens, specialize in reproduction while the others, the workers, participate in cooperative tasks such as building the nest, collecting food, rearing the young and defending the colony. This social organization provides numerous advantages and is the basis for the tremendous ecological success of social insects [1]. The sequencing of the honeybee genome [2] is an exciting step towards uncovering the molecular events underlying the evolution of altruism and complex behaviors.