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Hamadryas baboons (*Papio hamadryas*) have complex multi-level social systems and conflict mitigation strategies are necessary to preserve group cohesion and group-living benefits, (Aureli et al. 2002). Redirection of aggression, reconciliation, and consolation (or third-party affiliation) are behavioural strategies that can reduce likelihood of being the target of further aggression (Romero et al. 2009), reduce tension (Judge & Bachmann 2013), and repair (Colmenares & Silveira 2008) and/or improve social relationships (Butovskaya et al. 2013). When the first post-conflict contact occurs between former opponents, this is reconciliation (Silk 2002), but when it occurs between one opponent and a third-party, this is consolation (Butovskaya et al. 2015). These strategies may involve physical contact between individuals such as grooming, closer proximity between individuals, vocalizations, or gestures (Aureli et al. 2002). Memory of past events and individual recognition are certainly required (de Waal & Yoshihara 1983), but potentially also an understanding of others' thoughts (theory of mind) to understand implications of conflicts on individual relationships, group dynamics, and one's risk of being a future target of redirected or renewed aggression (Judge & Bachmann 2013).

The most common method to measure occurrence of any post-conflict behaviours is the PC-MC method which compares the timing of interactions in a post-conflict focal to an interaction baseline created using a control focal on the same individual, at a similar time, on the next possible day and when the individuals of interest are within a similar distance (de Waal & Yoshihara 1983). Interactions that occur earlier on or only in the post-conflict focal are considered behaviours influenced by the conflict (de Waal & Yoshihara 1983).

The possibility of conflict escalation, renewed aggression, or redirected aggression also causes stress among opponents but also bystanders (Judge & Bachmann 2013) who risk bodily harm and expend substantial energy in conflicts (Colmenares 1991). Stress is associated with an increase in glucocorticoid hormones like cortisol and increased rates of self-directed behaviours (SDBs) (Silk 2002). To test how stress can be impacted by different post-conflict strategies, researchers tested if individual rates of stress-associated SDBs change significantly before and after different interactions using paired *t*-tests (Judge & Bachmann 2013). It was found that rates of SDBs only decreased in individuals who reconciled or witnessed a reconciliation as a bystander but not after participating in or witnessing consolation (Judge & Bachmann 2013; Romero et al. 2009). These studies have shown that the likelihood of redirected or renewed

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aggression is reduced after both consolation and reconciliation, however (Romero et al. 2009). Thus, post-conflict strategies in hamadryas baboons have differing functions and are not interchangeable and must have more than a hormonal stress reduction function (Romero et al. 2009).

Conflicts may also cause relationship uncertainty – meaning that the benefits individuals reap from a relationship, their position within the group hierarchy, and/or their status as a group member may be threatened (Aureli et al. 2002). Maintenance of valuable relationships and group membership can provide an individual with access to resources, support, and defense which can improve their survival and reproductive outcomes (Aureli et al. 2002). To test if hamadryas baboons selectively repair or improve valuable social relationships, researchers conducted Wilcoxon tests on the PC-MC pairs to test for significant differences in occurrences of reconciliation or consolation between pairs with different relationship types (Butovskaya et al. 2013). It was indeed found that both reconciliation and consolation occur significantly more often between individuals within the same harem, but especially between males and females, the most valuable partnership in this species (Butovskaya et al. 2013; Butovskaya et al. 2015). Using similar methods, researchers have found that recipients of aggression and only males are likely to redirect their aggression to third parties (Butovskaya et al. 2013).

Future investigations are needed to determine if redirection of aggression reduces stress hormone levels in the initiator among hamadryas baboons, like has been found in other baboon species (Silk 2002). Additionally, the function of consolation as a unique strategy from reconciliation remains unclear so more research is needed (Romero et al. 2009). Finally, after reviewing the literature it seems worthwhile to investigate if there are efficacy differences between the strategies at reducing stress and if this depends on individual's roles in the conflict.

## References

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