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Commentary title: Core affective mechanisms maintaining group cohesion

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Abstract

As the third solution to group dispersion, Dunbar proposes primates use several higher order cognitive skills to especially manage 'weak ties' in a nuanced and fast-tracked way, therewith avoiding unnecessary conflicts. We here argue that subconscious, automatic processes including attention allocation and behavioral or neurophysiological state matching can serve a similar function in maintaining group cohesion.

Main text

In the target article, Dunbar outlines three different primate solutions to negate the natural and social mechanisms that drive large groups apart: structural (grooming networks), behavioral (increasing grooming time), and cognitive (to manage 'weak links'). For the latter, Dunbar specifically suggests several forms of meta-cognition are crucial because they allow individuals to consciously manage their relationships: e.g., inhibition (self-control) in conjunction with reading other's behavioral cues through mentalizing can help to avoid unnecessary conflicts possibly leading to group fragmentation (target article, sect. 2.3). However, we argue that primates also subconsciously and automatically attune to each other in many different ways, both externally and internally. For example, synchronization or mimicry at the physiological and behavioral level might increase group cohesion by matching other's physiological states. Moreover, automatically turning attention to the emotional expressions of group members might help to readily detect their emotional state and act accordingly. In this commentary, we will discuss how these mechanisms are equally (if not more) important for maintaining group cohesion as the meta-cognitive abilities discussed by Dunbar.

Attention is a limited resource that greatly impacts what information from the environment is being processed. In primates, implicitly and automatically turning attention to emotional expressions of

conspecifics favors processing of valuable social information. This gives the higher order cognitive processes that Dunbar discusses the necessary input for providing rapid social judgements and fast adequate responses. Socio-emotional attentional biases can be directly investigated in computerized tasks. Several studies using attention-capture or looking time paradigms have shown that orangutans, bonobos, chimpanzees and rhesus macaques show an attention bias toward socio-emotional versus neutral or other control scenes (e.g., Fumihiro & Tomonaga, 2010; Kret et al., 2016; Pritsch et al., 2017; van Berlo et al., 2024; Whitehouse et al., 2016). Results so far have been mixed (e.g., Kret et al., 2018), suggesting a selective bias toward negative socio-emotional stimuli and an influence of familiarity with the expressor (e.g., van Berlo et al., 2023). Future studies examining primate species with varying group sizes (such as baboons) could provide valuable insights into the role of socio-emotional attention bias.

Automatic mimicry has been observed on many different levels and in many different species (for a recent overview, see Diana & Kret, 2025). Evidence is especially widespread for motor mimicry (involving muscle movements), for example contagious yawning (orangutans, van Berlo et al., 2020; lemurs, Valente et al., 2022; pigs, Norscia et al., 2021; budgies, Miller et al., 2012) , scratch contagion (spider monkeys, Valdivieso-Cortadella et al., 2023; Japanese Macaques, Nakayama, 2004; orangutans, Laméris et al., 2020), and mimicry of facial expressions (bonobos, Bertini et al., 2022; gelada baboons, Mancini et al., 2013; macaques, Scopa & Palagi, 2016; meerkats, Palagi et al., 2019). Evidence for autonomic mimicry, such as changes in heart rate, skin conductance, and pupil diameter, is largely limited to humans due to obvious ethical and practical constraints. In nonhuman species, research on mimicry has primarily focused on behavioral aspects, leaving autonomic mimicry largely unexplored (see Diana & Kret, 2025). However, one study using eye-tracking showed that chimpanzees mimic pupil size of conspecifics (Kret et al., 2014).

Automatic mimicry is widely assumed to have an affiliative function and to increase social bonding. By matching each other's affective state (or "emotional 'raw feels' "), it can therefore provide a social glue keeping primate groups together, a function similar to the one Dunbar proposes for endorphins (target article, sect. 1.3). However, it has recently been proposed to also serve a more general predictive function related to the environment, including the behavior of conspecifics (Diana & Kret, 2025). This implies that the effect of mimicry is not always positive, but that, by predicting the behavior of conspecifics, it tends to smoothen social interactions. Being able to reliably predict and act upon negative behaviors and expressions of conspecifics may be equally important for maintaining group cohesion by avoiding unnecessary escalations. In the target article, Dunbar also discusses how being able to predict behavior of group members, especially of 'weak ties', is crucial to avoid unnecessary conflicts that can drive groups apart. However, he stresses the importance of higher-order cognitive functions to explicitly evaluate and manage relationships with group members that are not in an individual's direct grooming clique. Taking a step down, we propose that automatic mimicry can serve the same function in providing nuanced and fast-tracked ways to predict the social environment and manage social relationships.

In summary, we propose that attention allocation and automatic mimicry are underlying mechanisms that facilitate Dunbar's cognitive solution to primate group fragmentation. They strengthen social bonds and ease communication, thereby ameliorating the social stresses of group living. The role of these implicit mechanisms should be taken into account when considering how primates deal with the challenges that come with living in large groups. They seem to be present across species and genera and could provide a crucial 'glue' between conspecifics living together in large groups. Further investigating these mechanisms behaviorally and experimentally by employing novel techniques in touchscreen and eye-tracking based tasks, can shed further light on how they increase group cohesion in primates.

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