

2. Cheng, J.T. et al. (2013) Two ways to the top: evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. *J. Pers. Soc. Psychol.* 104, 103–125
3. van Vugt, M. and Smith, J.E. (2019) A dual model of leadership and hierarchy: evolutionary synthesis. *Trends Cogn. Sci.* 23, 952–967
4. Cheng, J.T. et al. (2010) Pride, personality, and the evolutionary foundations of human social status. *Evol. Hum. Behav.* 31, 334–347
5. Brand, C.O. and Mesoudi, A. (2019) Prestige and dominance-based hierarchies exist in naturally occurring human groups, but are unrelated to task-specific knowledge. *R. Soc. Open Sci.* 6, 181621
6. von Rueden, C.R. et al. (2014) Leadership in an egalitarian society. *Hum. Nat.* 25, 538–566
7. Garfield, Z.H. and Hagen, E.H. (2019) Investigating evolutionary models of leadership among recently settled Ethiopian hunter-gatherers. *Leadersh. Q.* Published online May 10, 2019. <https://doi.org/10.1016/j.leaqua.2019.03.005>
8. Henrich, J. (2016) *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter*, Princeton University Press
9. Brent, L.J.N. et al. (2015) Ecological knowledge, leadership, and the evolution of menopause in killer whales. *Curr. Biol.* 25, 746–750
10. Anicich, E.M. et al. (2015) When the bases of social hierarchy collide: power without status drives interpersonal conflict. *Organ. Sci.* 27, 123–140
11. Shaughnessy, B.A. et al. (2017) Informal leadership status and individual performance: the roles of political skill and political will. *J. Leadersh. Organ. Stud.* 24, 83–94
12. Henrich, J. et al. (2015) The Big Man mechanism: how prestige fosters cooperation and creates prosocial leaders. *Philos. Trans. R. Soc. Lond. Ser. B Biol. Sci.* 370, 20150013
13. Boehm, C. (1993) Egalitarian behavior and reverse dominance hierarchy. *Curr. Anthropol.* 34, 227–254

## Letter

# Leadership and Status in Mammalian Societies: Context Matters

Jennifer E. Smith<sup>1</sup> and Mark van Vugt<sup>2,3,\*</sup>



It is widely recognized that within mammalian societies an individual may be simultaneously a leader of collective behavior and hold a position of high status. Drawing from a comparative perspective, we recently suggested that some leaders are of low status or emerge in egalitarian societies lacking dominance hierarchies [1]. Furthermore, we noted that some high-ranking individuals, despite their priority access to

resources and ability to evoke submissive behaviors or win dyadic competitions, have little or no influence on collective group behavior [1].

Importantly, our recent article identifies some conceptual and empirical challenges regarding status and leadership when viewed through a comparative lens. Biological and social science literatures sometimes apply different definitions, which hinders progress. Dual models of human status [2] are based on three components: (i) priority access to limited resources, (ii) ability to win dyadic contests over resources, and (iii) relative influence on group decisions. However, only this third component describes activities that are associated across species with leadership [3]. In other words, as applied across species, leadership implies only that an individual has a disproportional influence on collective behaviors (e.g., group foraging, movements, conflict resolution, and between-group conflicts). Thus, whereas leadership refers to influence in a decision-making hierarchy, dominance status refers to a position within a resource hierarchy. Moreover, dominance status is relational within a pair of individuals and, in many cases, these pairwise relations are not necessarily transitive across group members (e.g., nonlinear or nontransitive resource hierarchies) [4]. By contrast, leadership status refers simply to whether an individual currently occupies a position in which they impose disproportional influence on group decisions. Our dual model approach to leadership therefore focuses solely on an individual's influence on collective behavior and emphasizes the value of this distinction in contributing to our understanding of the general principles and evolutionary origins of leadership.

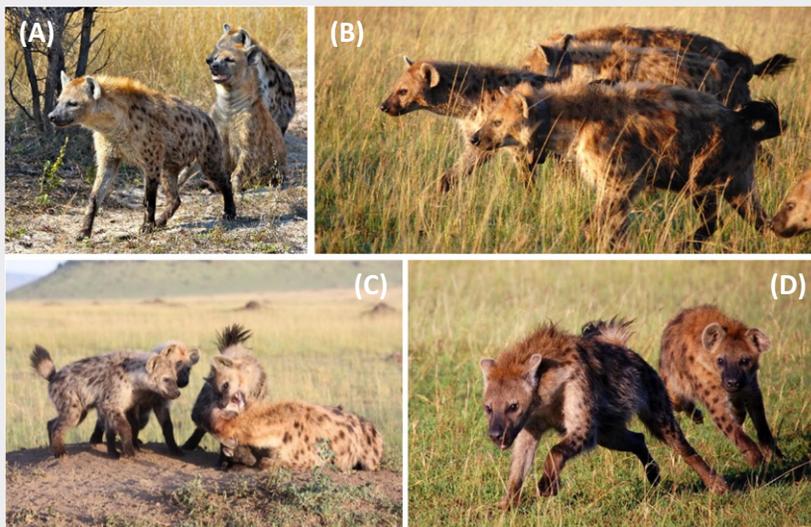
Although Cheng and Tracy [5] agree with us that not all high-status individuals are leaders, they question whether low-status individuals can be leaders and the extent

to which it is possible to disentangle notions of status and leadership. The comparative perspective offers insights into the empirical need to separate leadership and status. For example, hungry fish [6] or thirsty zebra [7] lead collective movements until their physiological needs are met, but this has no impact on their standing within their group. Moreover, mammals living in egalitarian societies also have leadership in collective behaviors despite a lack of status differences among group members [3]. Thus, leadership and status should be assessed independently – even if some individuals are both leaders and of high status at the same time. Recognition of this will push the field forward, permitting: (i) comparative studies to quantify each attribute's effect on collective behavior and (ii) research on humans to explore when leadership (e.g., influencing collective behavior) is displayed by low-status group members (e.g., children), members of low-status groups (e.g., lower socioeconomic classes, minority groups), or members of strictly egalitarian groups.

Leadership styles and, by extension, who is most likely to occupy a leadership role within a society, are often context dependent and variable over time. Our article highlights the ubiquity of this phenomenon in mammalian societies, noting that these context-dependent patterns across mammals (including humans) offer an understanding of the flexible nature of leadership. We point to this fluidity by explaining that the traits of individuals occupying leadership roles in mammalian societies often vary within species across four major contexts: collective movements, group foraging, within-group conflict resolution, and between-group conflicts [1,3]. Spotted hyenas offer a salient example of how the traits of individuals that emerge as leaders vary across context and time – even within a single species in which dominance status strongly influences many aspects of its social lives (Box 1).

**Box 1. Distributed, Context-Dependent Leadership in Spotted Hyenas**

Spotted hyenas are mammalian carnivores that live in female-dominated societies structured by fission–fusion dynamics in which the relative dominance status varies from hour to hour, as individuals leave (fission), or members of one subgroup join (fuse) members of another subgroup [12]. Stable dominance relationships are inherited based on the dominance status of an individual's mother such that physically smaller, natal juveniles are socially dominant to physically larger immigrant, adult males. However, an individual's relative status varies within each subgroup based on that subgroup's immediate composition. Which individuals assume leadership roles to influence collective behavior also varies across ecological major contexts (Figure 1). In some contexts, high-ranking hyenas lead most often, whereas in other contexts, such as during group hunting, individuals of low social status lead most often. Leaders vary over time, and who assumes a leadership role is based on the context-dependent traits.



**Trends in Cognitive Sciences**

**Figure 1. Context-Dependent Attributes of Leaders in Spotted Hyenas.** The emergence of leaders within the female-dominated societies of spotted hyenas varies across contexts (reviewed in [10]). In two contexts, adult females who are physically the largest and socially dominant lead most often: (A) collective movements: highest-relative ranking adult individual within a subgroup (often a lactating female; note the lactating female in front initiating group travel) and (B) between-group conflicts (warfare): high-ranking adult females join forces at the front line of battles targeting members of other social groups. In other contexts, other traits most strongly predict who immediately assumes a leadership role. For example, during (C) within-group conflict: natal individuals (juveniles or adult females) closely related to coalitionary allies lead most often in interventions; the three high-ranking natal juveniles on the left (including the leader with its open mouth) are smaller than but more influential than the physically larger target of coalitionary aggression (on the right). Finally, during (D) group hunting: low-ranking immigrant males (e.g., those with high energetic needs due to low priority of access to food) initiate hunts most often; note how the male leader in front is physically smaller than the high-ranking female follower joining him to hunt. Photograph credits: Steve Juvetson, Kate Shaw Yoshida, and Kenna Lehmann.

Spontaneous, shared leadership is common across mammalian societies [8,9] and emerging evidence indicates that multiple individuals often occupy leadership roles within groups of non-human animals, depending upon their motivational state, age/life history stage, personality,

social status, competence, and sex/gender [10]. The ubiquity of distributed leadership in nature has implications for human research too, suggesting organizations may benefit from when leadership roles are fluid and reflect context-dependent competencies [9].

Finally, although our recent article [1] focuses on commonalities in leadership styles across mammalian societies, there are differences too. For example, leadership roles in small-scale human societies are more widely shared among individuals than within large-scale human social organizations, possibly reflecting specialization as a function of social complexity [11]. Leadership may therefore be more strongly correlated with high status in large, complex organizations, such as in corporations and governments. Future research should investigate this hypothesis.

<sup>1</sup>Biology Department, Mills College, Oakland, CA, USA

<sup>2</sup>Department of Experimental and Applied Psychology, Institute for Brain and Behavior Amsterdam, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

<sup>3</sup>Department of Politics and International Relations, University of Oxford, Oxford, UK

\*Correspondence:

[m.van.vugt@vu.nl](mailto:m.van.vugt@vu.nl) (M. van Vugt).

<https://doi.org/10.1016/j.tics.2020.01.003>

© 2020 Elsevier Ltd. All rights reserved.

**References**

- van Vugt, M. and Smith, J.E. (2019) A dual model of leadership and hierarchy: evolutionary synthesis. *Trends Cogn. Sci.* 23, 952–967
- Cheng, J.T. et al. (2010) Pride, personality, and the evolutionary foundations of human social status. *Evol. Hum. Behav.* 31, 334–347
- Smith, J.E. et al. (2016) Leadership in mammalian societies: emergence, distribution, power, and payoff. *Trends Ecol. Evol.* 31, 54–66
- Drews, C. (1993) The concept and definition of dominance in animal behaviour. *Behaviour* 125, 283–313
- Cheng, J.T. and Tracy, J.L. (2020) Why social status is essential (but sometimes insufficient) for leadership. *Trends Cogn. Sci.*
- Krause, J. et al. (2000) Leadership in fish shoals. *Fish* 1, 82–89
- Fischhoff, I.R. et al. (2007) Social relationships and reproductive state influence leadership roles in movements of plains zebra, *Equus burchellii*. *Anim. Behav.* 73, 825–831
- Smith, J.E. et al. (2015) Collective movements, leadership and consensus costs at reunions in spotted hyaenas. *Anim. Behav.* 105, 187–200
- Gronn, P. (2002) Distributed leadership as a unit of analysis. *Leadersh. Q.* 13, 423–451
- Smith, J.E. et al. (2018) Obstacles and opportunities for female leadership in mammalian societies: a comparative perspective. *Leadersh. Q.* Published online September 26, 2018. <https://doi.org/10.1016/j.leaqua.2018.09.005>
- von Rueden, C. and van Vugt, M. (2015) Leadership in small-scale societies: some implications for theory, research, and practice. *Leadersh. Q.* 26, 978–990
- Smith, J.E. et al. (2008) Social and ecological determinants of fission–fusion dynamics in the spotted hyaena. *Anim. Behav.* 76, 619–636