

Status and Dominance Hierarchies

Denise D. Cummins¹

Department of Psychology and Department of Philosophy, University of Illinois, Champaign, IL, USA

Denise D. Cummins
Email: denise.cummins87@gmail.com

Without Abstract

Denise D. Cummins is retired.

Synonyms

[Social Ranking](#)

Definition

A social structure in which some individuals have priority of access to resources relative to others.

Introduction

In most species (including humans), competition and cooperation among members of a social group produces a complex social structure called a **status (or dominance) hierarchy** in which some individuals have regular priority of access to resources and fertile mates in competitive situations. These individuals are referred to as high status (or high ranking). Individuals who have lower priority of access are called subordinate or low status. In its most developed form, the dominance hierarchy is transitive, meaning that if A has priority over B and B has priority over C, then A has priority over C and so on.

Because of their privileged access to resources, higher-status individuals are less likely to die of predation or starvation and more likely to leave living offspring. Among species in which status is unstable, the level of reproductive success achieved by any individual is directly related to the length of time during which that

individual is high ranking. Accordingly, there is a direct relationship between status and *inclusive fitness* (reproductive success of individuals and their closely related kin).

In small-scale human societies, men's social status is positively associated with various indices of reproductive success such as number of mates and surviving offspring (von Rueden [2014](#)). In large-scale, modern human societies, status is highly correlated with potential fertility (as estimated from copulation frequency), accounting for as much as 62 % of the variance in this proximate component of fitness (Pérusse [1993](#)). This value is comparable to that found in small-scale societies.

Types of Status Hierarchies

According to an influential model of hierarchical sociality, there are two systems of status – “two ways to the top” (Henrich and Gil-White [2001](#)). In the **dominance** route, physical intimidation and coercive power are used to achieve high-status positions. In the **prestige** route, skills and knowledge translate into social influence and social status. Among species in which rank is unstable (as opposed to fixed and inherited), status in both types of hierarchy depends on individual differences in physical characteristics and social cognition acumen.

Physical Correlates of Status

Physical size. Physical size and rank are correlated in many species, with larger individuals tending to be higher ranking (Ellis [1995](#)). Successful leaders in both small-scale and large-scale modern human societies tend to be taller than average and to possess more masculine facial and vocal characteristics (Mayew et al. [2013](#); Stulp et al. [2013](#)).

Age. Adolescent chimpanzees are subordinate to all adult males, and status striving among males typically involves younger males challenging older ones. Rank declines with physical age, but alphas may maintain high-ranking positions through coalitions with other males.

In small-scale human societies, older adults typically fill leadership roles. This is primarily because they have had more time to accrue task-relevant knowledge and interpersonal skills and have larger adult kinship networks. During times of institutional change or informational obsolescence, however, younger individuals are more likely to hold leadership roles.

Gender. Female dominance over males is rare among mammals, being reliably observed only in hyenas, horses, bonobo chimpanzees (*Pan paniscus*), and certain species of monkeys, such as macaques and vervet monkeys.

Leadership positions in small-scale human societies typically are held by men. Women's opportunities tend to

be limited by demands of caring for multiple dependent offspring, who spend more time as prereproductives than any other species. These caregiving demands limit opportunities for networking beyond the extended family.

Hormone-dependent social interaction styles. Status correlates with levels of sex hormones and cortisol in many species of primates, including humans. Higher testosterone levels are associated with higher social rank in nonhuman primate males and human males (Sherman et al. 2015). In female chimpanzees, higher levels of circulating estradiol are associated with higher status; in human females, it correlates positively with measures of implicit dominance motives (Stanton and Edelman [2009](#)).

Eisenegger et al. ([2011](#)) provide detailed summaries of research on the relationship between testosterone levels and dominance or status behaviors. They report that salivary testosterone levels correlate with implicit measures of power motivation, increased vigilance for status threats, and high-risk tolerance. They also report that single-dose administration of testosterone reduces subconscious fear and fear-potentiated startle response, reduces trust in economic games, reduces cognitive empathy, and increases social cooperation.

Cortisol inhibits the impact of testosterone, and the interplay of these two hormones has been found to regulate status-related behaviors (Mehta and Josephs [2010](#)): Across two studies of leadership and competitive behavior, testosterone was found to positively correlate with dominance, but only in individuals with low cortisol. In individuals with high cortisol, the relation between testosterone and dominance was blocked or reversed, particularly following social defeat. These findings suggest that high testosterone levels facilitate status attainment only when cortisol is low. When cortisol is high, the impact of testosterone is blunted.

These findings were replicated in a study based on 78 male executives (Sherman et al. [2016](#)). Despite the myriad nonhormonal factors that determine organizational promotion, the executives' hierarchical position in their organizations could be accurately predicted from their endogenous testosterone and cortisol levels: Testosterone positively predicted executives' number of subordinates, but only among low-cortisol executives.

Numerous studies have also found that the relationship between hormone levels and status is bidirectional, that is, changes in status can have profound impact on testosterone, cortisol, and serotonin levels. Following contests of rank among nonhuman primates, defeated males exhibit a drop in testosterone levels, while winners' levels rises; serotonin levels rise in subordinates who improve their social status. Among humans, male winners typically show elevated testosterone levels relative to losers; this is true even when the competition involves little physical action, as in chess competitions or contests in reaction time (see Eisenegger et al. [2011](#)).

Compared to socially dominant individuals, subordinate or submissive individuals have higher baseline cortisol levels and display greater changes in physiological stress indices during conflict and slower recovery from conflict-induced changes in cardiovascular activity measures. The reason for this may lie in the

diminished power lower-ranking individuals possess to control events in their everyday lives.

Social Skills, Reputation, and Social Capital

Among male primates, rank within the dominance hierarchy is acquired and maintained through dyadic aggression, and alliances determine the fate of outranked individuals. Importantly, these alliances are formed and maintained through cooperative effort or, more precisely, through the formation of reciprocal obligations. During agonistic encounters, individuals typically call for help, and *non-kin* allies are more likely to supply that help if the individual in question has groomed them, shared food with them, or assisted them in agonistic encounters in the past. Similarly, they punish noncooperators by directly aggressing against them when they themselves request help, failing to come to their aid, or by misinforming or failing to inform them about the location of food.

What counts as sufficient reciprocation also depends on rank. Among those close in rank, the rate of intervention by individual A on behalf of B is proportional to the rate of intervention of B on behalf of A. But high-ranking individuals need not to reciprocate as often as subordinates in order to maintain an alliance. The most frequent explanation given for this is that greater benefits derive from their interventions due to their priority of access to physical and social resources. Accordingly, nonhuman primates often focus their alliance-building efforts on higher-status individuals. For example, baboons, macaques, and vervet monkeys form matrilineal hierarchies in which any female is dominant to all the females that are subordinate to her mother, and she is subordinate to all the females that are dominant to her mother (Cheney and Seyfarth [1990](#)). During agonistic encounters, support is typically given to the higher-ranking females who in turn intervene in conflicts when they themselves are dominant to the target of the aggression. By aiding higher-ranking females, lower-ranking females form strong alliances based on reciprocal obligations that enable them to move up in rank.

In small-scale human societies, men with large kinship networks are more likely to gain political influence, but social support from non-kin is also instrumental in the acquisition and maintenance of status (see von Rueden [2014](#)). Among Tsimane men, influence within small groups and at the level of the community depends on social support from non-kin as well as kin, and the formation of such alliances depends on cooperation through activities such as food sharing. To express commitment to food sharing, some societies, such as the Ache of Paraguay and Hadza of Tanzania, consider it taboo for hunters to consume portions of their own kills or to brag about their hunting prowess. Instead, successful hunters are expected to deprecate their own achievements and to share meat generously. Doing so not only facilitates alliance formation but signals quality as a mating partner.

Henrich et al. ([2005](#)) conducted a cross-cultural study on social decision-making involving 15 small-scale horticultural, foraging, and pastoral cultures in Africa, South America, and Asia. The tasks involved

economic games in which participants are given an opportunity to cooperate with or exploit others in economic transactions. A cornerstone of economic theory is that rational agents are self-interested, that is, when making choices about allocations of resources, rational agents make choices that maximize benefits to themselves. But that is not what the researchers found. The rational self-interest model failed to a large degree in all of the societies. For example, in the ultimatum game, one party proposes how to divide a resource (proposer), and the other party is allowed to accept or reject the offer (responder). If the offer is accepted, the resource is divided as agreed. If the offer is rejected, no one gets anything. Many ultimatum proposers among the Au and Gnau of Papua New Guinea offered their partners more than half, but they were frequently rejected. The authors interpreted this pattern of behavior as a reflection of status seeking through gift giving, which is common throughout Melanesia. In these societies, accepting gifts implies a strong obligation to reciprocate, and reciprocation often takes the form of political alliances.

More than a decade of research in large-scale industrialized societies has also challenged the legitimacy of the “rational agent” model as a descriptive model of human behavior. People do not always seek outcomes that maximize benefits for themselves. Instead, our choices appear to be equally motivated by concerns about fairness, equity, and reciprocity. The modal response in studies based on economic games is to trust with the expectation of reciprocity, and failures to reciprocate are met with retaliation in subsequent games. In fact, players and observers are willing to pay a penalty for the opportunity to punish nonreciprocators (Fehr and Fischbacher [2004](#)). In order to accommodate these results, normative theories have been proposed in which reciprocity, altruism/spite, and inequity aversion play prominent roles. When viewed from these theoretical perspectives, individuals enter economic transactions with normative standards of fairness, and their decisions are guided in large part by distance from the expected normative division. Behavior that departs significantly from these norms elicits retaliatory, spiteful, or other apparently “irrational” response profiles that depart significantly from predictions based on simple self-interest.

Even here, however, the impact of relative status looms large, as does the way in which status is achieved. When the role of proposer is awarded arbitrarily, proposers behave fairly toward their transactional partners (offering close to 50 %), and responders typically reject unfair offers. But when told transactional roles have been assigned on the basis of performance on competitive outcome (e.g., score on a trivia test), exploitation becomes the modal response: High-ranking individuals offer their low-ranking partners less and low-ranking responders are willing to accept less (Hoffman et al. [1996](#)).

When status is awarded on the basis of prestige, however, high-ranking individuals behave more generously toward low-ranking transactional partners, a norm referred to as *noblesse oblige*. Fiddick et al. ([2013](#)) investigated tolerance toward nonreciprocation in participants from seven countries that vary along hierarchical and individualist/collectivist social dimensions. They found strong and converging evidence of *noblesse oblige* in all seven countries. Compared with participants who adopted an employee perspective, those who adopted a boss perspective were far more willing to continue a reciprocal arrangement despite

significant noncompliance, were more likely to feel they had been treated fairly, felt less animosity toward their cheating partners, and believed they got the better deal because they felt they bore less cost and received higher value from the arrangement. These results obtain even when the employee was described as having higher income than the boss (due to sales commissions) (Fiddick and Cummins [2007](#)). The authors interpret this pattern of results to mean that noblesse oblige is a cross-cultural norm whose function is to honestly signal phenotypic quality through costly displays which enhance reproductive success, successful alliance formation, and enhanced feelings of internal satisfaction (utility). Alternately, high-status individuals might be more altruistic not because of costly signaling but because their reputations are more easily damaged owing to more intensive scrutiny.

Social Cognition and Status Acquisition

Status hierarchies are rarely static structures. They are instead dynamic structures in which individuals vie for control of resources. Higher-ranking individuals defend their privileged access to resources by detecting and punishing acts that threaten privileged access, while lower-ranking individuals attempt to engage in forbidden activities in order to secure a larger share of resources. In order to survive, an individual must be capable of performing – on a nearly continual basis – the following cognitive tasks: (a) making rank and kinship discriminations, (b) recognizing what is forbidden and what is permitted based on one's rank (social norm cognition), and (c) deciding whether to engage in or refrain from activities (reciprocity, “mind reading”) that will allow one to move up in rank (i.e., garner a larger share of resources). These are the reasoning problems that impact most directly on survival and reproductive success.

Investigations of social interactions in a variety of species (including humans) have found that those who achieve high status are those who are particularly adept at these types of social cognition. In other words, *selection favors those who have social and political intelligence*.

Rank discrimination. Nonhuman primates readily make kinship and rank discriminations among individuals in their social groups, a skill that depends on transitive reasoning when all possible dyadic interactions are not directly witnessed (Cheney and Seyfarth [1990](#), pp. 91–96). (They infer that A is dominant to C given that they have witnessed interactions in which A is dominant to B and B is dominant to C.) In contrast, they can perform transitive inference on object-oriented tasks only after considerable drilling with paired stimuli (Gillan [1981](#)).

Human infants as young as 10 months of age can infer dominance hierarchies from observing interactions between similarly sized actors (Gazes et al. [2015](#)). Status hierarchies are apparent in the play groups of preschool children as young as 2 years of age (Strayer and Trudel [1984](#)), and the transitive relations can be reliably reported verbally by 4-year-olds. Yet, like other primates, children can perform object-based transitive reasoning only if they are extensively drilled on the object pairs upon which the inference is to be

performed. Truly content-free transitive reasoning does not reliably appear until 6 years of age. As early as 3 years of age, preschoolers are able to infer dominance not only from physical supremacy but also from decision power, age, and resources (Charafeddine et al. ([2015](#))). They also have expectations regarding the ways in which a dominant and a subordinate individual are likely to differ in that they expect an individual who imposes his choice on another to exhibit higher competence in games and to have more resources. Children also prefer to associate with and imitate high status as opposed to low-status individuals.

Santamaria-Garcia et al. ([2015](#)) combined event-related potentials (ERP) and structural magnetic resonance imaging (MRI) to reveal the neuroanatomical substrates of early status recognition. Participants performed a task either with a superior or with an inferior player. The pattern of ERP and imaging results indicated early recognition of social hierarchies through activation of a network involved in the automatic recognition of social identity.

These results indicate that rank discrimination cognition emerges early in development and functions fluidly as an automatic cognitive process through adulthood.

Social norms. From a cognitive standpoint, a social hierarchy is, essentially, *a set of social norms that constrain the behavior of individuals depending on their rank* (Cummins [1998](#)). Norms are socially constructed objects that are created by agents to direct the behavior of other agents over whom they have authority. They prescribe constraints on social behavior that dictate what is permitted and obligated. An agent succeeds in creating a norm depending on whether the agent has the authority to do so.

In animal societies, these “social norms” are implicit yet reflected in virtually every activity, including who is allowed to sit next to, play with, share food with, groom, or mate with whom. In order to avoid punishment (or ostracism, which can mean death due to predation or starvation), individuals must learn what is *permitted*, what is *forbidden*, and what is *obligated given their place in the hierarchy*. High-ranking individuals monitor the behavior of subordinates in order to protect their privileged access to resources. High-status individuals typically take on the role of enforcing these implicit “social norms,” aggressing against those who violate them and breaking up disputes between lower-ranking individuals (Boehm [1999](#)).

All human societies depend on social norms to regulate daily interactions. These norms may be implicit or explicitly codified as regulations or laws. Social norm reasoning has been found to emerge early in human cognitive development; very young children show a marked *precocity* for acquiring social rules and monitoring compliance with them (see Cummins [2013](#)). Children as young as 3 years of age do not just follow social norms; they actively enforce them on others – even when serving as spectators rather than players in the game. They do not need to be explicitly instructed about the rules by an authority, but they do need to see that an authority expects such behavior. When asked to test compliance with social rules, 3-year-olds also spontaneously seek out potential rule violations, readily distinguish rule-violating behavior from compliant behavior, and provide cogent explanations as to why violating instances constitute violations of the rule. In fact, their performance is equivalent to adults on these social reasoning tasks. In contrast, when asked

to perform a nonsocial task of apparent equal complexity (test the truth of a rule rather than monitor compliance), children and adults fail to seek out potentially falsifying evidence, often fail to distinguish confirming from falsifying instances, and cannot give coherent justifications for their decisions.

These studies indicate that the average 3-year-old has as firm a grasp on the implications of socially prescriptive rules as the average adult, while the average adult fails to grasp the normative rules for testing the truth of rules or hypotheses.

Mind reading. Unlike objects, agents move of their own volition and are motivated by internal states that are not directly perceivable by others. As a result, successful cooperation and competition frequently depends on forecasting the behavior of others, a skill referred to as “mind reading” by the ethologists. In psychology, the term “theory of mind” is used to refer to the ability to not only forecast behavior but to attribute mental states (beliefs, intents, desires, knowledge) to oneself and others and to understand that others have beliefs, desires, intentions, and perspectives that are different from one’s own.

A singular cognitive skill that relies on mental attribution is **deception**. A successful deception creates a false belief in the one deceived. Subordinates in primate hierarchies engage in deceptive behavior that improves their access to resources (Byrne [1995](#)). For example, they conceal objects or behaviors from others by hiding them from view, acting quietly so as not to attract attention, avoiding looking at desirable objects themselves, or distracting attention away from the desired object or forbidden behaviors. This behavior allows subordinates to garner a larger share of resources immediately or to increase the probability of future rewards if the deception involves surreptitious food sharing or grooming to form alliances that can be called upon during contests of rank.

The neocortex ratio expresses the relative volume of the neocortex compared to the volume of the rest of the brain. It correlates with the mean group sizes that characterize primate species, with larger group sizes corresponding to greater neocortical volume. This ratio correlates with the prevalence of tactical deception observed across primate species (Byrne [1995](#), pp. 219–221). Not surprisingly, species that show the greatest capacity for this type of deception (such as common chimpanzees) also have the most unstable hierarchies. Greater cognitive skill mitigates the impact of physical size and strength in dominance acquisition and maintenance. It is difficult to physically dominate individuals who have the cognitive wherewithal to outwit you and to form stealth alliances with others. In order to dominate such individuals, one must have the cognitive wherewithal to recognize and thwart acts of deception whose target is flouting norms concerning privileged access to resources.

The manner in which mind reading is successfully deployed to acquire and maintain status depends on the size of the social group; the larger the group, the more likely deception will succeed. For example, the ability to persuade through oratory is typically requisite for gaining political influence within small-scale societies, even those that seemingly lack formal authority, such as the !Kung and the Semai of Malaysia. But in such societies, trustworthiness, generosity, and fairness are integral to leader emergence and effectiveness (von

Rueden et al. [2014](#)). Accordingly, most have developed norms and traditions regarding leadership that depend on demonstrating these qualities, thereby protecting members against exploitation by leaders. For example, although hunting prowess is a ubiquitous determiner of male social status in human small-scale societies, meat-sharing generosity determines coalitional support and hence stability of political leadership (von Rueden et al. [2014](#)). Generosity must be carefully deployed to signal less about their wealth and more about its use to benefit the community. This usually means that generosity must be combined with obvious signs of humility to avoid sowing distrust rather than affiliation.

As Boehm ([1999](#)) observes, the egalitarianism of small-scale societies is often misconstrued as an absence of dominance motivations (or status striving) on the part of group members. Yet, as von Rueden and van Vugt ([2015](#)) point out, leaders in these societies may orchestrate collective actions that produce goods more beneficial to themselves and their kin. For example, wealthy Barabaig pastoralists enforce conservation of grazing land because their larger herds stand to benefit the most. They may also claim a fee for their services through a greater share of normatively regulated benefits (e.g., rights to polygyny). Instead, small-scale society egalitarianism is better understood as an active leveling of would-be dominants through norms compelling humility and coordinated punishment of aggrandizers (Boehm [1999](#)). In short, leaders must carefully manage perceptions of their generosity and fairness or risk censure, ostracism, or even execution.

While small-scale human societies frequently institute norms that proscribe deceptive exploitation, modern large-scale societies frequently fall prey to (and even reward) such behavior. For example, the GLOBE surveys on leadership in 62 modern large-scale societies show that integrity is a universally highly valued leader trait (Den Hartog et al. [1999](#)). Yet in these societies, individuals who are perceived and rated as socially dominant are better at deceiving others, persuading others, and interpreting others' intentions. von Rueden and van Vugt ([2015](#)) present a comprehensive review of research on large-scale industrial societies which indicates that individuals who are narcissistic or overconfident are often selected as leaders despite null or even negative consequences for groups. They point out that in these contexts, overconfident and narcissistic leaders are often mistaken for competent and agreeable leaders because they are persuasive, charming, and sociable. Deceptive traits associated with psychopathy may be socially adaptive in the short run in large populations of altruistic and trusting individuals.

Sex Differences in Status Striving

Among mammals, females necessarily invest more energy in reproduction than do males (e.g., pregnancy and lactation), and females are typically more involved in the care of very young offspring (i.e., infants and toddlers). Comparatively speaking, therefore, female reproduction is limited by access to resources, while male reproduction is limited by access to mates. Female lifelong reproductive success is enhanced by investing in offspring to ensure their survival. For this reason, women traditionally have competed for high-

status men who typically control more resources. For example, women in polygynous societies that restrict the avenues women may pursue to obtain resources typically prefer to be one of the many co-wives of a prosperous man than the only wife of a poor one. In western cultures that have legally enforced monogamy and relatively greater financial opportunities available to women, high-status men are nonetheless still preferred as mates and as partners in extramarital affairs (Pérusse [1993](#)).

Intrasexual competition among females has received less attention from researchers than has intrasexual competition among males. This seems partly due to the fact that females compete in far subtler ways than do males. Males tend to use direct confrontation to dominate and subdue potential threats and rivals, while females prefer to use indirect means that can easily go undetected, such as spreading rumors aimed at ruining a potential rival's reputation, excluding, ignoring, and isolating her socially. A 2014 study conducted by the Workplace Bullying Institute found that 30 % of office bullies were women, and these female bullies targeted other women more than two-thirds of the time using indirect means of aggression. Fisher ([2015](#)) proposed that females often prefer low-risk competitive strategies because they typically are the primary caregivers and protectors of offspring.

These sex differences in competitive strategies appear to be rooted in a social proscription against direct and overt female displays of dominance. Such displays diminish women's likability while enhancing men's likability and negatively impact outcomes such as hirability (Williams and Tiedens [2016](#)). Implicit forms of dominance (e.g., eye contact), however, do not negatively impact these factors for females. The authors point out that the effect of dominance on men's and women's perceived competence did not differ, which indicated that these subjective social evaluations obstruct women from adopting leadership roles. In other words, women must seek to dominate rivals without appearing to do so.

These sex differences seem to be facultative rather than obligate in that they are significantly impacted by environmental contingencies. Gneezy et al. ([2008](#)) compared female competitive strategies in two distinct societies: the patriarchal Maasai of Tanzania and the matrilineal Khasi of India. Maasai men were apt to compete at roughly twice the rate as Maasai women, but this result was reversed among the Khasi, where women chose the competitive environment more often than Khasi men and even chose to compete more often than Maasai men did in their culture.

Cross-cultural sex differences exist for basic human values relevant to status striving. Men attribute more importance than women do to self-interested values such as power, achievement, and self-direction values, while women attribute more importance than men to other-regarding values such as benevolence and universalism. Power values pertain to the attainment and protection of status, prestige, and dominance over people and resources. Achievement values pertain to personal success through demonstrating competence according to social standards. In contrast, benevolence values motivate people to preserve and enhance the welfare of close others (e.g., offspring and other kin), while universalism values have as their goal promoting the welfare of all people and for nature. But a reexamination of these factors conducted by Schwartz and

Rubel-Lifschitz ([2009](#)) indicated that in societies with greater gender equality, both men and women attributed more importance to benevolence, universalism, and self-direction. Increased individual resources of wealth, education, and autonomy that accompany greater gender equality facilitate the expression and attainment of these values.

Conclusion

Status hierarchies are ubiquitous in the societies of human and nonhuman animals. These hierarchies constitute social norms that constrain behavior of individuals depending on their rank, dictating what is permitted or obligated in social interactions. They emerge as a result of individual differences in traits that impact access to resources, with higher-ranking individuals gaining priority of access to resources in competitive situations. Some of these traits that contribute to status acquisition and maintenance are physical in nature, such as size, age, and gender. Others pertain to social skills and cognition, such as skill at forming alliances based on reciprocal obligations, persuasion through oratory, or manipulation of beliefs through deception.

Cross-References

[Access to Resources](#)

[Competition for Females](#)

[Competition for Resources Desired by Females](#)

[Cooperative Alliances](#)

[Dominance and Health](#)

[Dominance in Humans](#)

[Female Mate Choice](#)

[Higher Status in Group](#)

[In Nonhuman Primates](#)

[Increase Status](#)

[Negotiate Status Hierarchies](#)

[Nonhuman Primates](#)

[Primate Dominance Hierarchies](#)

[Reciprocal Altruism](#)

[Reproductive Strategy](#)

[Resource Competition](#)

[Resource Control Theoretic Approach to Dominance](#)

[Resources for Reproduction](#)

[Sex Differences](#)

[Sexual Strategies Theory](#)

[Shared Resource Defense](#)

[Social Status and Economic Resources](#)

[Status and Redistribution of Resources](#)

[Status and Reproductive Success](#)

[Status and Resources for Survival](#)

[Status and Sexual Access](#)

[Status and Sexual Opportunity](#)

[Ultimate Resource Control Hypothesis](#)

References

Boehm, C. (1999). *Hierarchy in the forest: The evolution of egalitarian behavior*. Cambridge, MA: Harvard University Press.

Byrne, R. (1995). *The thinking ape: Evolutionary origins of intelligence*. Oxford: Oxford University Press.

[CrossRef](#) 

Charafeddine, R., Mercier, H., Clément, F., Kaufmann, L., Berchtold, A., et al. (2015). *Journal of Cognition and Development*, 16, 587–607.

[CrossRef](#) 

Cheney, D. L., & Seyfarth, R. M. (1990). *How monkeys see the world*. Chicago: University of Chicago Press.

Cummins, D. D. (1998). Social norms and other minds: The evolutionary roots of higher cognition. In D. D. Cummins & C. A. Allen (Eds.), *The evolution of mind* (pp. 30–50). New York: Oxford University Press.

Cummins, D. D. (2013). Deontic reasoning as a target of selection: Reply to Astington and Dack. *Journal of Experimental Child Psychology*, 116, 970–974.

[CrossRef](#)  [PubMed](#) 

Den Hartog, D. N., House, R. J., Hanges, P. J., Ruiz-Quintanilla, S. A., & Dorfman, P. W. (1999). Culture-specific and cross-culturally generalizable implicit leadership theories: Are attributes of charismatic/transformational leadership universally endorsed? *The Leadership Quarterly*, *10*, 219–256.

[CrossRef](#) 

Eisenegger, C., Haushofer, J., & Fehr, E. (2011). The role of testosterone in social interaction. *Trends in Cognitive Sciences*, *15*, 263–271.

[CrossRef](#)  [PubMed](#) 

Ellis, L. (1995). Dominance and reproductive success among nonhuman animals: A cross-species comparison. *Ethology and Sociobiology*, *16*, 257–333.

[CrossRef](#) 

Fehr, E., & Fischbacher, U. (2004). Third party punishment and social norms. *Evolution and Human Behavior*, *25*, 63–87.

[CrossRef](#) 

Fiddick, L., & Cummins, D. D. (2007). Are perceptions of fairness relationship specific? The case of noblesse oblige. *Quarterly Journal of Experimental Psychology*, *60*, 6–31.

Fiddick, L., Cummins, D. D., Janicki, M., Lee, S., & Erlich, N. (2013). A cross-cultural study of noblesse oblige in economic decision-making. *Human Nature*, *24*, 318–335.

[CrossRef](#)  [PubMed](#) 

Fisher, M. (2015). Women's competition for mates: Experimental findings leading to ethological studies. *Human Ethology Bulletin*, *30*, 53–70.

Gazes, R. P., Hampton, R. R., & Lourenco, S. F. (2015). Transitive inference of social dominance by human infants. *Developmental Science*, *18*, 1–10.

[CrossRef](#) 

Gillan, D. J. (1981). Reasoning in the chimpanzee: II. Transitive inference. *Journal of Experimental Psychology: Animal Behavioural Processes*, *7*, 150–164.

Gneezy, U., Leonard, J. L., & List, J. A. (2008). *Gender differences in competition: Evidence from a Matrilineal and a Patriarchal Society* (The National Bureau of Economic Research Working Paper No. 13727).

Henrich, J., & Gil-White, F. (2001). The evolution of prestige: Freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior*, *22*, 165–196.

[CrossRef](#)  [PubMed](#) 

Henrich, J., Boyd, R., Bowles, S., Camerer, C., et al. (2005). “Economic man” in cross-cultural perspective: Behavioral experiments in 15 small-scale societies. *The Behavioral and Brain Sciences*, 28, 795–855.

[PubMed](#) 

Hoffman, E., McCabe, K., & Smith, V. (1996). Social distance and other-regarding behavior in dictator games. *American Economic Review*, 86, 653–660.

Mayew, W., Parsons, C., & Venkatachalam, M. (2013). Voice pitch and the labor market success of male chief executive officers. *Evolution and Human Behavior*, 34, 243–248.

[CrossRef](#) 

Mehta, P. H., & Josephs, R. A. (2010). Testosterone and cortisol jointly regulate dominance: Evidence for a dual-hormone hypothesis. *Hormones and Behavior*, 58, 898–906.

[CrossRef](#)  [PubMed](#) 

Pérusse, D. (1993). Cultural and reproductive success in industrial societies: Testing the relationship at the proximate and ultimate levels. *Behavioral and Brain Sciences*, 16, 267–322.

[CrossRef](#) 

Santamaria-Garcia, H., Burgaleta, M., & Sebastian-Galles, N. (2015). Neuroanatomical markers of social hierarchy recognition in humans: A combined ERP/MRI study. *Journal of Neuroscience*, 35, 10843–10850.

[CrossRef](#)  [PubMed](#) 

Schwartz, S. H., & Rubel-Lifschitz, T. (2009). Cross-national variation in the size of sex differences in values: Effects of gender equality. *Journal of Personality and Social Psychology*, 97, 171–185.

[CrossRef](#)  [PubMed](#) 

Sherman, G. D., Lerner, J. S., Josephs, R. A., Renshon, J., & Gross, J. J. (2016). The interaction of testosterone and cortisol is associated with attained status in male executives. *Journal of Personality and Social Psychology*, 110(6), 921–929.

[CrossRef](#)  [PubMed](#) 

Stanton, S. J., & Edelstein, R. S. (2009). The physiology of women’s power motive: Implicit power motivation is positively associated with estradiol levels in women. *Journal of Research in Personality*, 43, 1109–1113.

[CrossRef](#) 

Strayer, F. F., & Trudel, M. (1984) Developmental changes in the nature and function of social dominance

among young children. *Ethology and Sociobiology*, 5, 279–295.

[CrossRef](#) 

Stulp, G., Buunk, A. P., Verhulst, S., & Pollet, T. V. (2013). Tall claims? Sense and nonsense about the importance of height of US presidents. *The Leadership Quarterly*, 24, 159–171.

[CrossRef](#) 

von Rueden, C. (2014). The roots and fruits of social status in small-scale human societies. In J. T. Cheng, J. L. Tracy, & C. Anderson (Eds.), *The psychology of social status* (pp. 179–200). New York: Springer.

von Rueden, C., & van Vugt, M. (2015). Leadership in small-scale societies: Some implications for theory, research, and practice. *The Leadership Quarterly*, 26, 978–990.

[CrossRef](#) 

von Rueden, C., Gurven, M., Kaplan, H., & Stieglitz, J. (2014). Leadership in an egalitarian society. *Human Nature*, 25, 538–566.

[CrossRef](#) 

Williams, M. J., & Tiedens, L. Z. (2016). The subtle suspension of backlash: A meta-analysis of penalties for women's implicit and explicit dominance behavior. *Psychological Bulletin*, 142, 165–197.

[CrossRef](#)  [PubMed](#) 