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Contact: S. H. Lee (seokwhan94@gmail.com);

S. Yamamoto (shinyayamamoto1981@gmail.com)

The Evolution of Prestige: Perspectives and Hypotheses from Comparative Studies

Sok Hwan Lee [a,*] & Shinya Yamamoto [a,b,*]

a: Wildlife Research Center, Kyoto University, Kyoto, Japan

b: Institute for Advanced Study, Kyoto University, Kyoto, Japan

*** co-correspondence authors:**

S. H. Lee (seokwhan94@gmail.com); S. Yamamoto (shinyayamamoto1981@gmail.com)

Abstract

In this review, we reorganize the concept and highlight the importance of prestige in humans and non-human animals by introducing key characteristics of dominance and prestige and related theories. Previous studies with non-human animals have mainly focused on dominance, presuming prestige as a human-unique social trait. However, to deepen our understanding of the evolution of prestige, comparative studies with non-human animals, especially our evolutionary closest relatives, chimpanzees and bonobos, are essential. We propose the direction of future studies to investigate how prestige has emerged as a viable strategy for gaining social rank while diverging from dominance, which will establish a foundation for investigating the impact of prestige on propensities

towards large-scale cooperation and cumulative culture which are still considered unique to humans. Such comparative viewpoints on prestige, along with some hypotheses of species differences, will provide powerful guidance for understanding the evolution of social hierarchies.

1. Introduction

Many animal social structures are characterized by social hierarchies. Individuals strive to navigate their position in a hierarchy as higher rank is influential, ensures privileges of access to resources, and receives deference. Recent studies on humans have established the concept of dual-strategies theory of social rank, which suggests that humans attain social ranks by using dominance or prestige strategy, each involving distinct approaches (Cheng et al., 2013; Maner, 2017; Maner & Case, 2016) (Figure 1). Dominance refers to a strategy of inducing fear, through intimidation and coercion to demand deference while prestige is based on freely conferred deference for demonstrating skills, knowledge, and altruism in valued domains (Cheng et al., 2013; Henrich & Gil-White, 2001) (Table 1). While there are many efforts to study the efficacy of the dual-strategies theory of social rank in humans, the evolutionary origin of the two strategies and their divergence from each other remains a mystery. Prestige is considered to be a unique trait to humans and non-human animal hierarchies are mainly thought to be established and maintained based solely on dominance. Therefore, most non-human animal studies have only focused on the importance of dominance while little attention has been given to the possibility of prestige in the non-human

50 animal society. In this review, we summarize the importance of studying prestige in non-human
51 animals, examine the theoretical and empirical evidence, and propose future directions and several
52 hypotheses for investigating the evolution of prestige in non-human animals.

53

54 **2. What is prestige?**

55

56 The dual-strategies theory of social rank was generated based on the Henrich & Gil-White (2001)'s key
57 argument that prestige has emerged from our tendency for social learning. Those who confer prestige identify
58 and select models who are likely to possess better-than-average knowledge in the group to reduce individual
59 learning costs and enhance learning environment. Therefore, humans have evolved to rank individuals along
60 the dimension of their skills and thus, knowledgeable individuals acquire higher position in the prestige-based
61 social rank (Cheng et al., 2013). Moreover, prestige is closely associated with altruism. But altruism solely
62 cannot result in prestige because it does not necessarily incur true deference especially from the free-
63 riders and copiers might be reluctant to learn a skill that inflicts cost to themselves (Henrich &
64 Gil-White, 2001). However, when generosity is coupled with valued expertise, it can promote
65 prestige as means of advertising the generous individuals' skills (Cheng & Tracy, 2014; Tracy et
66 al., 2010). Following these accounts, we maintain that prestige should be defined and investigated in non-
67 human animals focusing on their capacity for social learning associating with prosocial aspects.

68

69 **3. Dual-strategies theory of social rank: dominance vs. prestige**

Dual-strategies theory of social rank holds that both dominance and prestige aid in attaining social rank (Cheng et al., 2013; Maner 2017; Maner & Case, 2016; McClanahan et al., 2021). However, dominance and prestige are the products of distinct selection pressures as they involve different motivations in pursuing social rank (Figure 1). Therefore, to investigate the evolution of prestige, we need to understand the main differences within underlying mechanisms of dominance and prestige and the attributes of social ranks derived from each strategy in human society (Table 2).

The underlying psychology of dominance strategy is linked with coercion; intimidation through aggressive means used to demand deference from subordinates and punish those who lack it (Cheng et al., 2013). In consequence, subordinates tend to fear high-ranking individuals and thus avoid being in proximity to them (Maner & Case, 2016; Öhman, 1986). In contrast, prestige strategy does not demand but promotes the willing deference of copiers. Prestigious individuals who demonstrate and share their skills and knowledge receive recognition and admiration from the group members in exchange. In order to maximize their social learning opportunities for learning such behaviors, copiers preferentially choose to learn from the most successful models, seek close proximity and provide services to them for potential interactions (Henrich & Gil-White, 2001).

Both dominance and prestige result in a social rank, which is a position within a social hierarchy that affords the capacity to influence others (Blader & Chen, 2014; Cheng et al., 2013; McClanahan, 2020) (Table 1). Social rank allows one to rise into positions of leadership, a strategy of influencing individuals to contribute to group goals (Bass, 1990; Hollander, 1985; Van Vugt, 2006; Van Vugt et al., 2008), and the leadership behaviors based on dominance and prestige are also distinct. Dominant leadership is

91 associated with tendency to protect one's own social rank or personal privileges, while prestige
92 leadership is achieved by displaying desirable traits and abilities that benefit the group, not for
93 personal gain (Maner & Case, 2016).
94 Differences in leadership styles result in distinctive hierarchical structures built on these two strategies.
95 Dominance hierarchies are steep as high-ranking individuals typically exert control over power of resources
96 (Cheng et al., 2013). Thus, lower-ranked individuals constantly seek opportunities to ascend (Maner & Case,
97 2016), while higher-ranking individuals tend to exclude subordinates who could potentially threaten their
98 positions to protect their own social rank over the good of the group (Maner & Mead, 2010). Alternatively,
99 prestige hierarchies are egalitarian as high-ranking individuals gain their social rank based on the freely given
100 deference of lower-ranking individuals (Boehm, 1999). To maintain their rank, prestigious individuals
101 behave prosocially to increase admiration from lower-ranking individuals, especially by sharing assets that
102 benefit the group as a whole (Maner & Case, 2016).
103 In summary, prestigious individuals are likely to show four main components derived from the
104 copiers' adaptations for efficient social learning (Henrich & Gil-White, 2001; Maner & Case,
105 2016) (Table 3). Prestigious individuals are more often approached by others because copiers try
106 to maintain proximity to their models to enhance their learning reliability and accuracy. Also,
107 they receive gifts and services from their copiers as they try to seek interactions with their models
108 to gain easier access to valuable information. Furthermore, prestigious individuals are
109 preferentially copied by others, which is an adaptation evolved in order to save individual
110 learning costs. Lastly, like their behavioral traits, values and ideas of prestigious individuals are
111 likely to be imitated. Thus, in combination with the humans' tendency to rank prestigious

112 individuals in higher position, prestige can result in the attainment of leadership which allows to
113 influence others with one's opinions.
114
115 **4. Importance of prestige in human society**
116
117 So why is prestige important in human society? First of all, our current society has been shaped
118 from our proclivity to pursue stable and cooperative environments. Our ancestors from hunter-
119 gatherer societies, where group members were highly interdependent, acted upon a prestige-based
120 egalitarian society as a means for maintaining cooperation (Boehm, 1999). But throughout recent
121 history, steep hierarchies built on dominance have grown prevalent in the control of large-scale
122 material resources and the division of labor and social roles (Van Vugt et al., 2008). In modern days,
123 we still utilize dominance mainly in large-scale, coercive authorities to effectively punish
124 noncooperators (Ozono, 2021). Yet, we also emphasize the importance of prestige in maintaining
125 cooperation as we actively prevent the concentration of powers in certain groups and individuals
126 and social norms that favor egalitarianism suppress dominance and facilitate behaviors that benefit
127 the group (Boehm, 1999; Ozono, 2021; Zeng et al., 2022). Furthermore, our society operates based
128 on the economic market where we select partners with the best products and services in valued
129 domains, resulting in cooperation instead of violence (Noë, & Hammerstein, 1994; Noë &
130 Hammerstein 1995), indicating that assets from prestigious individuals are granted with high values.
131 Therefore, although both dominance and prestige are both important contributors for maintaining

stable and cooperative society, these accounts are closely linked to our current preference towards prestige strategy, especially group-benefitting behaviors, unlike the self-interested motives from dominance strategy (Henrich et al., 2015).

Prestige also plays an important role in the formation of culture. Henrich & Gil-White (2001) proposed that humans have a capacity for social learning, which has evolved with adaptations for facilitating effective information transmissions. As a consequence, prestige-biased learning, or preferentially learning from knowledgeable individuals, has become a crucial part of our culture due to our tendency to select models based on their level of prestige (Atkisson et al., 2012; Brand et al., 2020; Brand et al., 2021; Chudek et al., 2012; Jimenez & Mesoudi, 2019; McGuigan, 2013). This capacity for social modeling presents itself in our preference for prestige, ultimately leading to a cumulative cultural evolution (Henrich et al., 2015). From these theoretical examples, prestige has proven to be effective and prevalent in our society, making it important to conduct more in-depth investigation on the shaping of these trends from the evolutionary perspective.

5. Dominance and prestige in non-human animals

Most studies on social hierarchy assume that prestige is exclusive to humans because humans are only capable of high-fidelity imitation of another's behavior (Cheng, 2020; Henrich & Gil-White, 2001), while dominance is considered a principal way of increasing fitness in non-human animals. Thus, non-human animal studies are mostly centered on dominance and there is a lack of investigation on the possibility of

prestige. However, to understand the evolution of current human social hierarchy and its underlying mechanisms, more attention must be given to prestige-like features in non-human animals.

Previously, efforts have been made on discovering features that are functionally similar to prestige. The leverage concept, a power based upon resources that cannot be taken by force, suggested that non-human animals do attain advantage during social conflicts without relying on dominance (Chapais, 2015; Hand, 1986; Lewis, 2002; de Waal, 1996). However, leverage is a more inclusive concept than prestige, comprising broader sources that do not necessarily involve social learning. For example, fertilizable egg is an inalienable commodity of an estrus female that aids in increasing her leverage advantage (but not prestige) against other non-estrus females or males regardless of dominance. But because prestige, by definition, has evolved based on our capacity for social learning, we need to focus on commodities found in non-human animals that are associated with social learning in order to accurately investigate the evolution of prestige.

Several lines of evidence support the relationship between prestige and social learning in non-human animals. It has been previously found that chimpanzees prefer to learn from older and experienced individuals (Biro et al., 2003; Horner et al., 2010; Matsuzawa et al., 2008). Although the successful social models in Horner et al (2010) were highly ranked in their dominance hierarchy, it is important to note that they had past success on relevant tasks while unsuccessful models were inexperienced. Also, juvenile vervet monkeys observed adults more frequently than other similarly aged conspecifics (Grampp et al., 2019). Additional studies revealed that individuals do not necessarily observe and copy the actions or skills of dominant conspecifics (vervet monkeys: Botting et al., 2018; brown capuchin monkeys: Dindo et al., 2011) or choose to learn from knowledgeable models over dominant individuals (chimpanzees: Kendal et al., 2015). These

findings suggest while dominance rank may not be an appropriate proxy for social modeling, experience and knowledge may be and therefore prestige-biased learning occurs in non-human animals.

Moreover, experimenters introduced a novel skill that produces food reward to certain individuals chosen for being trained prior to the sharing of their new knowledge with other group members. As a result, skilled individuals received more grooming or were more frequently approached by other individuals than before the experiment (Fruteau et al., 2009; Stammbach, 1988). In a similar study of lemurs, skill performers became more socially central in both grooming and proximity networks and the effects lasted even after the experiment (Kulahci et al., 2018). We still cannot conclude that grooming and physical proximity in these experiments are equivalent to the attainment of prestige or prestige-based social rank, however we should note that these variables are key features of prestige (Henrich & Gil-White, 2001). Therefore, further investigations are needed to test whether the increase in these variables resulted from the possession of novel knowledge could be associated with other cues of prestige (Table 3). Then, we can draw a firm conclusion that each of these variables could indicate gain of prestige or prestige-based social rank in non-human animals.

6. Future perspectives

To test the above questions, we propose a comparative experiment with non-human animals.

Following the main cues for measuring prestige and prestige-based social rank in humans, we should focus on testing the correlation between social centrality values constructed with the number of proximate individuals and frequency of grooming received (Kulahci et al., 2018; Reyes-Garcia et al., 2008) and frequency of being copied by other individuals (Brand et al., 2020; Horner et al., 2010) as possible measurements for prestige in non-human animals (Table 3). Based on this relationship, we can investigate whether knowledgeable individuals tend to be influential during collective actions as a means of leadership granted from prestige-based social rank (Brand & Mesoudi, 2018; Cheng et al., 2013; McClanahan et al., 2021) (Table 3).

Taking these methods into account, we should first investigate whether mere possession of a no vel skill can lead to a change in social centrality in non-human animals (Table 4). Specifically, we propose an experiment in which we teach certain individuals how to solve a novel puzzle box that rewards the performer with food once solved. Then, we will allow the individuals to demonstrate the skill in front of naïve group members and observe whether this increases their centrality values like the results from previous studies (Fruteau et al., 2009; Kulahci et al., 2018; Stammbach, 1988). Based on this result, we can further test if these demonstrators with increased centrality are preferentially copied by other conspecifics and influential during shared decision-making context. Results from this study will provide a foundation for the investigation on prestige-based strategy being a viable strategy for gaining social rank, along with the interspecific differences.

Future investigation should address the role of prestige strategy in the development of cooperation

and cumulative culture (Table 4). Comparing the efficacy of self-rewarding and group-rewarding skill or socially learnable and socially non-learnable skill in gaining prestige will provide potential evidence for the interdependence of prosociality and cumulative culture with prestige. Different versions of the puzzle box that provide food reward also to the nearby audiences or cannot be imitated by mere observation in proximity to the demonstrator can be utilized for these investigations.

7. Hypotheses on prestige-based strategies in chimpanzee and bonobos

Our phylogenetically closest relatives, chimpanzees and bonobos, are often studied as comparative models for understanding human social systems (Hare & Yamamoto 2015). Here, we propose three hypotheses on the possible differences of prestige-based strategies between chimpanzees and bonobos in various viewpoints for future investigations on the evolutionary background of prestige (Table 4).

We first focus on the dual-strategies theory of social rank considering the differences in the nature of hierarchical structures of chimpanzees and bonobos. Due to the contrasting social structures led by opposite sexes, we expect species differences in the efficacy of prestige-based strategies for acquiring a social rank. Chimpanzees have a steep, male-dominated hierarchy with frequent aggression and competition for social rank and resources (Goodall, 1986). As a consequence, abilities related to dominance will be more essential than those related to prestige. Thus, prestige-

233 based strategy may be less effective for social rank ascension, especially within male hierarchies.
234 In contrast, bonobo society is female-centered with a relatively more egalitarian nature, based on
235 tolerance towards lower-ranking individuals and outgroup members (de Waal, 1998; Furuichi,
236 2011). As bonobos show reduced intensity of aggression relative to chimpanzees (Furuichi, 2011;
237 Hare et al., 2012; Peterson & Wrangham, 1997), high-ranking bonobos may put less importance
238 on dominance for maintaining their social rank. Thus, prestige-based strategies, especially in
239 dominant females, may more prominently affect bonobo rank than that of chimpanzees. In bonobos,
240 the oldest females with knowledge of their niche tend to lead group-initiation movements, while
241 only dominance rank and not age predicts males who lead (Tokuyama & Furuichi, 2017), raising
242 the possibility that prestige can be well acknowledged, especially in females.

243 From the viewpoint of differences in prosocial or cooperative nature between the two species, we
244 hypothesize that prestige-based strategy, especially other-rewarding behaviors, will be more
245 recognized in bonobos than chimpanzees. Massen et al. (2010) maintained that long-tailed
246 macaques have been utilizing prosocial behaviors as a strategy for enhancing or maintaining their
247 social rank. This raises the possibility that such a strategy may also be applicable to our closest
248 relatives. Bonobos are known to exhibit greater levels of prosociality than chimpanzees (Tan et al.,
249 2017), especially in food sharing contexts (Krupenye et al., 2018; Nolte & Call, 2021; Tan & Hare,
250 2013; Yamamoto, 2015). Considering these results, in bonobo society where prosociality is more
251 pervasive, behaviors like voluntary food sharing that reward other group members will possess
252 more concrete value as a strategy for gaining prestige than in chimpanzee society.

253 Another important point to consider is the differences in material culture between the two species.
254 Tool use has been found in both chimpanzees and bonobos as chimpanzees mostly use tools for
255 foraging purposes (McGrew, 1992; Boesch and Boesch, 1990) whereas bonobos for social function
256 (Ingmanson, 1996). However, their proficiency at and frequency of tool use significantly differ,
257 where chimpanzees tend to have more advanced and frequent tool use than bonobos in the wild
258 (Furuichi et al., 2015; Hohmann & Fruth, 2003; Koops et al., 2015) despite the evidence that these
259 apes are equally proficient at tool use in captivity (Gruber et al., 2010). We therefore predict that
260 chimpanzees will be more dependent on possession and transmission of material skills due to their
261 increased intrinsic motivation towards manipulation of tools than their relatives (Koops et al., 2015).
262 In other words, an acquisition of novel skill in tool use in chimpanzees will have more prominent
263 impact in earning prestige than in bonobos.

264

265 **8. Conclusion**

266

267 In this review, we have reorganized the concept and highlighted the importance of prestige in
268 humans and non-human animals by introducing key characteristics of dominance and prestige and
269 related theories. Our hypotheses on the possible differences between chimpanzees and bonobos
270 can help build the conceptual basis for understanding how prestige has emerged as a viable strategy
271 for gaining social rank while diverging from dominance, as well as its impact on propensities
272 towards large-scale cooperation and cumulative culture which are still considered unique to

humans.

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Tables

Table 1. Glossary of terminologies for the dual-strategies theory of social rank

Term	Definition
Dominance	Induction of fear, through intimidation and coercion to demand deference
Prestige	Freely conferred deference and recognition for demonstrating skills, knowledge, and altruism in valued domains
Social Rank	A position within a social hierarchy that affords the capacity to influence others, high social rank allows one to take on a leadership role by influencing others to contribute to group goals

Table 2. Main differences between dominance and prestige

	Dominance	Prestige
Mechanisms of influence	Coercion, intimidation, aggression	Admiration, respect, liking, social modeling
Source of deference	Deference is demanded and is a property of the actor, fears higher-ranking individuals	Freely conferred and is a property of the perceiver, does not fear higher-ranking individuals
Followers' proximity to higher-ranking individuals	Tend to avoid	Tend to seek proximity, provide services to higher-ranking individuals for interaction
Nature of group hierarchies	Relatively steep, power held by most dominant individuals, subject to change in higher ranks due to occasional challenges, higher-ranked individuals exclude highly skilled subordinates to prevent threats to their positions	Egalitarian, individuals hold prestige within areas defined by their knowledge and skillset, higher-ranked individuals prioritize the success of the group, display prosocial behaviors to gain respect and admiration

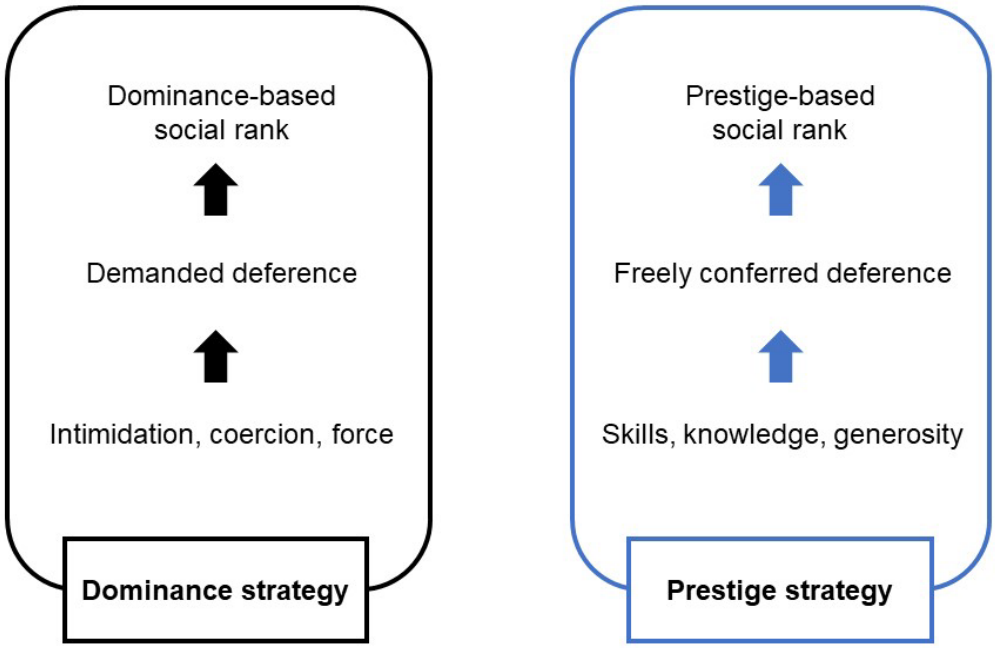
Table 3. Prestige cues in humans and their possible corresponding measurements in non-human animals

Prestige Cues in Humans	Possible Measurements of Prestige in Non-human Animals
Prestigious individuals are more often approached by others (Henrich & Gil-White, 2001)	Social centrality measured based on the number of proximate individuals
People seek interactions with prestigious individuals by providing services (Henrich & Gil-White, 2001)	Social centrality measured based on the frequency of grooming received
People preferentially copy behaviors of prestigious individuals (Henrich & Gil-White, 2001)	Frequency of being copied by other individuals
Prestigious individuals attain leadership (Henrich & Gil-White, 2001; Maner & Case, 2016)	Success rate for initiation of group decision-making process

Table 4. Overview of proposed hypotheses about possible differences in prestige between chimpanzees and bonobos and corresponding experiments and predictions for each hypothesis

Hypothesis	Factual Background	How to Test	Prediction
Nature of hierarchical structures	Steeper hierarchy with more intense aggressions in chimpanzees than bonobos	Effect of a novel skill in prestige-based social rank	More prominent increase in prestige-based social rank will be observed in bonobos than chimpanzees
Prosociality	More frequent prosocial behaviors in bonobos (e.g., food sharing) than chimpanzees	Comparison between the effect of self-rewarding and group-rewarding skill in earning prestige	Group-rewarding skill will be more effective and will be more prominent in bonobos than chimpanzees
Tool usage	More advanced and frequent tool use in wild chimpanzees than bonobos	Comparison between the effect of socially learnable and socially non-learnable skill in earning prestige	Socially learnable skill will be more effective and will be more prominent in chimpanzees than bonobos

506 **Figures**



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508 **Figure 1**. Diagram for illustrating the dual-strategies theory of social rank