Two Signals of Social Rank: Prestige and Dominance associated with distinct nonverbal displays

by

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Abstract

Converging evidence suggests that generalized high rank is communicated via various nonverbal behaviors (e.g., expansiveness), but prior studies have not examined whether two distinct forms of high social rank – known as *prestige* and *dominance* –are communicated via distinct nonverbal displays. Across five studies using carefully controlled experimental designs and the assessment of spontaneously displayed behaviors during a laboratory-based group interaction and a real-world political contest, we found that these two strategies are associated with distinct sets of nonverbal behaviors. Specifically, prestige, or the attainment of rank through earned respect, and dominance, or the use of intimidation and force to obtain power, are communicated from different head positions (i.e., tilted upward vs. downward), smiling (i.e., presence vs. absence), and different forms of bodily expansion (i.e., subtle chest expansion vs. more grandiose space-taking). These findings provide the first evidence for two distinct signals of high rank, which spontaneously emerge in social interactions and guide social perceptions and the conferral of power.

Lay Summary

The current research suggests that prestige and dominance are associated with distinctive nonverbal signals, which facilitate influence. Prestige – the communication of knowledge and expertise – is associated with subtle forms of expansiveness (chest expanded, torso pushed out), a smile, and an upwards head tilt, whereas dominance – using aggression to intimidate others – is associated with larger space-consuming forms of expansiveness (e.g., arms out from body, wide stance), reduced smiling, and a downwards head tilt. Our findings are consistent with the suggestion that humans use distinct sets of nonverbal behaviors to communicate their prestige and dominance, and observers rely on these distinct behaviors to identify and attribute status to prestigious and dominant individuals.

Preface

Chapter 5 is based on work conducted in UBC's Emotion and Self Laboratory by professor Jessica Tracy and Dr. Joey Cheng. I was responsible for data analyses and writing for all data relating to nonverbal behavior. Several measures from Chapter 5 has been published, but this is the first manuscript to address nonverbal behavior. Cheng, Tracy, Henrich, Foulsham (2013) Two ways to the top: Evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. Journal of Personality and Social Psychology. 104: 103-125. For chapter X, I conducted all analyses and wrote up all results. This project was approved by the Behavioral Research Ethics Board under the project title "Group Task" and certificate number H07-00904.

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Acknowledgments

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1 Introduction

Many species across the animal kingdom use distinctive, readily interpreted nonverbal displays to signal high rank (Ballentine, Searcy, & Nowicki, 2008; de Waal, 2007; deCarvalho, Watson, & Field, 2004; Goodall, 1986; Hall, Coats, & LeBeau, 2005). Humans, too, convey their rank through easily understood nonverbal behaviors, such as increased bodily expansiveness and expressions of pride (Hall et al., 2005; Tracy & Shariff, 2009). In humans, however, high rank may come in more than one form. A growing body of research suggests that people attain social rank via two different strategies, both of which effectively promote influence over others and shape others' attention, yet result in notably different forms of leadership (Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013; Cheng, Tracy, & Henrich, 2010; Maner & Case, 2016). These strategies have been labeled *prestige*, which refers to the demonstration of knowledge and expertise to earn respect and freely chosen followership, and *dominance*, which refers to the use of aggression and intimidation to induce fear and forced deference (Cheng et al., 2010; Cheng & Tracy, 2014; Henrich & Gil-White, 2001). Although a large body of research has examined the nonverbal behaviors that humans use to communicate generalized high rank (e.g., Hall et al., 2005), these studies tended to amalgamate prestige and dominance (along with other terms associated with high rank such as status, influence, leadership, wealth, and SES; see Cheng et al., 2013; Ellyson & Dovidio, 1985; Hall et al., 2005; Cheng & Tracy, 2013), and no prior studies have tested whether these two distinct forms of high rank are associated with distinctive behavioral displays. Though there are likely adaptive benefits to communicating generalized high rank, there is also good reason to expect prestige and dominance to be associated with discriminable nonverbal displays (Henrich & Gil-White, 2001).

1.1 Why Communicate High Rank?

Across species, a variety of adaptive benefits are accrued by those who effectively send and receive signals of high rank through readily identified nonverbal displays. Individuals who can successfully communicate their own deservedness of high rank are likely to receive increased social influence and attention (Cashdan, 1998; Cheng et al., 2013; Foulsham, Cheng, Tracy, Henrich, & Kingstone, 2010), a greater allocation of potentially scarce resources (Brown & Maurer, 1986; Cole, 1981), higher quality mates (Vacharkulksemsuk et al., 2016; Apicella, Feinberg, & Marlowe, 2007), and deference (Holland, Wolf, Looser, & Cuddy, 2016; Sell, Cosmides, & Tooby, 2014; Fromme & Beam, 1974). Conversely, an ability to recognize high rank in others can help avoid potentially costly agonistic encounters (Ellyson & Dovidio, 1985; Stirrat, Stulp, & Pollet, 2012; Třebický et al., 2015; Trebicky, Havlicek, Roberts, Little, & Kleisner, 2013), facilitate social learning opportunities (Martens, Tracy, & Shariff, 2012; Martens & Tracy, 2013) and the identification of desirable mates (Fink, Neave, & Seydel, 2007; Havlicek, Roberts, & Flegr, 2005), and facilitate power maneuvering (Muller & Mazur, 1997; Todorov, 2005).

A large body of research suggests that humans reliably communicate high rank to conspecifics using two overlapping sets of nonverbal behaviors (Hall et al., 2005; Shariff & Tracy, 2009; Tiedens & Fragale, 2003; Tracy & Matsumoto, 2008).[1] First, high ranking individuals tend to show open and expansive bodily displays including chest expansion, arm movements extended outward, open leg positions, wide stances, hands behind the head with elbows out, and other physically enlarging behaviors (Hall et al., 2005). These same behaviors

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[1] Although we focus here on visibly observed nonverbal behaviors, several studies have demonstrated that humans also communicate rank through vocal signals (e.g., Cheng, Tracy, Ho, & Henrich, 2016; Puts, Gaulin, & Verdolini, 2006; Leongómez, Mileva, Little, & Roberts, 2017).

are perceived as indicative of high-rank by signal receivers, and result in rank conferral (Anderson & Kilduff, 2009; Marsh, Yu, Schechter, & Blair, 2009; Tiedens & Fragale, 2003). Furthermore, expansive nonverbal behaviors have been shown to communicate high rank across populations (Bente, Leuschner, Issa, & Blascovich, 2010; Hwang, Matsumoto, Yamada, Kostić, & Granskaya, 2016) and in several different species, including chimpanzees (Goodall 1986; de Waal, 2007), great tits (Verbeek, Boon, & Drent, 1996), and dome spiders (deCarvalho, Watson, & Field, 2004). These findings suggest that, at a broad level, bodily expansion may be an evolved signal of high rank—likely as a result of a more ancient association between sheer size and increased status (Stulp, Buunk, Verhulst, & Pollet, 2015; Blaker & van Vugt, 2014; Marsh et al., 2009).

Second, individuals who have increased in rank also tend to display the emotion expression of pride, which features arms extended out from the body, either with hands on hips or raised above the head with clenched fists, chest expanded, head tilted slightly upward, and a slight smile (Tracy & Matsumoto, 2008; Tracy & Robins, 2007; Tracy & Robins, 2004). Given that pride is a prototypical emotional response to success, and may function in part as an internal barometer of success (Weidman, Tracy, & Elliott, 2016), it is not surprising that this display is automatically and cross-culturally associated with perceptions of high rank (Shariff, Tracy, & Markusoff, 2012; Shariff & Tracy, 2009; Tracy, Shariff, Zhao, & Henrich, 2013). In fact, the pride expression has been shown to trigger automatic associations with concepts related to the possession of knowledge and expertise (Martens, 2014; Martens & Tracy, 2013; Birch, Akmal, & Frampton, 2010), and, presumably because those who possess knowledge make good social models (Henrich & Gil-White, 2001), the pride expression cues copying and social learning (Martens et al., 2012; Martens & Tracy, 2013). Although expansiveness is an important part of

the pride expression, Shariff and Tracy (2009) found that perceptions of high rank made on the basis of pride expressions do not emerge solely as function of observed expansiveness.

There is thus good evidence to suggest that expansive behavioral displays in general and the pride expression in particular evolved to communicate high rank. In all of these prior studies, however, social rank has been treated as a uni-dimensional construct. Researchers have assessed rank perceptions using a variety of terms (e.g., power, dominance, status), but often in inconsistent ways and without providing clear definitions (for a review see Cheng et al., 2013; Ellyson & Dovidio, 1985). This practice likely resulted from a longstanding absence of clearly defined rank-related constructs within the psychological science literature. However, in light of recent research delineating two distinct forms of high rank, the time is ripe to examine whether these different patterns of rank attainment and leadership are associated with distinct nonverbal displays.

1.2 Why Might Humans Use Distinct Signals to Communicate Prestige and Dominance?

Signaling to conspecifics one's dominance or one's prestige, as opposed to sending a message of undifferentiated high rank, is likely to have more specific adaptive benefits. Prestigious leaders tend to be empathic and helpful toward followers (Henrich, Chudek, & Boyd, 2015); in fact, their power is directly predicated on their willingness to share what they know with subordinates (Cheng et al., 2013; Cheng et al., 2010). As a result of their kindness and generosity, these leaders tend to be adored by followers, who willingly defer to them and may allow them to retain their power—or at least their place in the social group—even when their contributions are not as significant (Cheng et al., 2010; Henrich & Gil-White, 2001; Maner & Case, 2016; Maner & Mead, 2010). By communicating their prestige to followers through a recognizable nonverbal

display, these individuals might effectively inform others that they possess knowledge or skills that should be copied, and also that they are likely to treat followers with warmth and compassion.

In contrast, dominant leaders' power derives primarily from intimidation; group members typically defer to dominants not because they want to, but because they feel threatened by the potential consequences of non-compliance (Cheng et al., 2013; 2010). In order to retain their influence, dominants therefore need to induce fear in followers; if subordinates do not perceive them as threatening, they will not grant them power.[2] By communicating a willingness to inflict harm without actually engaging in an agonistic encounter, dominance signalers might acquire increased rank while avoiding the unnecessary costs of physical altercations (assuming a subordinate decides not to challenge the dominant). In fact, animals across numerous species use nonverbal signals of dominance to attain rank while avoiding unnecessary agonistic encounters (Blaker & van Vugt, 2014; Johnstone & Norris, 1993; Maynard Smith & Price, 1973).

Given the distinct social messages that prestigious and dominant leaders need to send in order to retain their power – kindness, empathy, and knowledge or competence on the one hand, and threat, intimidation, and strength on the other— it is likely that these two forms of leadership would be associated with distinct nonverbal signals. This expectation is further supported by the fact that prestigious leaders would suffer costs from accidentally communicating dominance; fearful followers would avoid them rather than seek them out as social models, resulting in a loss of status earned from freely chosen deference. Correspondingly, dominant leaders who accidentally communicate prestige would undercut their ability to elicit fear and intimidation by

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[2] One interesting exception, however, is that when threatened or experiencing uncertainty, individuals may preferentially select dominant leaders, whose force and coercive capacities become deemed as locally valued attributes (Kakkar & Sivanathan, 2017; Lausten & Petersen, 2017; van Vugt & Grabo, 2015).

instead conveying warmth and approachability.

It would likewise be adaptive for subordinate group members to reliably distinguish between leaders' displays of prestige and dominance. Group members benefit from copying and therefore closely following prestigious leaders, but that is less likely to be the case for dominants, and those who copy a dominant leader may be perceived by the leader as a threat or source of competition, which could generate an aggressive response (Maner & Mead, 2010). Furthermore, copying a dominant's aggressive tendencies could have high physical costs if the subordinate does not possess the physiological prowess to win fights (Sell, Hone, & Pound, 2012; Sell, 2011). Correspondingly, although in a dominance hierarchy subordinates' survival is often predicated on their ability to appease leaders while simultaneously avoiding them, avoiding a prestigious leader results in lost learning opportunities. In short, correctly identifying distinct displays of dominance and prestige would allow observers to engage in appropriate approach or avoidance responses toward high-ranking individuals.

Given these presumed benefits of displaying and recognizing prestige and dominance through distinct nonverbal displays, we predict that these two forms of leadership will be associated with distinct sets of recognizable nonverbal behaviors, which will be spontaneously displayed during social interactions, and used by observers to form accurate impressions of leaders' particular rank-attainment strategy. Although a large body of research has identified a number of behaviors that communicate high rank, and one set of studies found that dominant (but not prestigious) individuals effectively use distinct vocal cues (dynamically lowering their pitch over the course of an interaction) to convey their threat and formidability (Cheng, Tracy, Ho, & Henrich, 2016), no prior studies have examined whether prestige and dominance are communicated with visually distinct nonverbal behaviors.

1.3 What might Distinct Nonverbal Displays of Prestige and Dominance Look Like?

One way to conceptualize the distinction between prestige and dominance is via the interpersonal circumplex of agency and communion (Wiggins, 1979; Wiggins, Trapnell, & Phillips, 1988). Both prestige and dominance are highly agentic strategies, as both involve the attainment of influence and power over others (Wiggins, 1979; Wiggins et al., 1988). The two strategies differ, however, in communion. Prestige involves the demonstration of warmth, caring, and prosociality (i.e., highly communal behaviors), whereas dominance involves aggressive, unempathic, and antisocial behaviors (i.e., low communal behaviors; Cheng et al., 2010). Building on this account, we would expect both dominance and prestige to be communicated from behaviors that convey high agency, but differ in their association with behaviors that convey communion.

1.3.1 Nonverbal Behaviors Related to Both Dominance and Prestige

Given the large body of evidence showing a strong association between high rank and expansiveness or size (Hall et al., 2005; Yap, Mason, & Ames, 2013), we expect expansive bodily displays to be a signal of agency, and thus associated with both prestige and dominance. Furthermore, expansive displays function to increase the apparent physical size of nonverbal displayers (Marsh et al., 2009), and larger individuals are perceived as both more prestigious and more dominant (see Blaker & van Vugt, 2014). Studies have shown, for example, that larger individuals are perceived as more intelligent and better leaders, consistent with prestige strategists (Blaker & van Vugt, 2014; Blaker et al., 2013; Case & Paxson, 2008), but also as possessing an increased likelihood of winning agonistic encounters, consistent with dominance (Archer & Thanzami, 2007; Olweus, 1994; Parker, 1974; Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011; Matsumoto & Hwang, 2012). Expansive and enlarging behaviors that are likely to communicate agency include body and arm movements that increase the physical size of the

signaler, such as arms extended outward from the body with hands on hips or raised in the air (Shariff & Tracy, 2009; Tracy & Robins, 2007), as well as widened stance, expansive chest, and extending one's legs out from the body (Gifford, 1991, 1994; Hall et al., 2005; Rule, Adams Jr, Ambady, & Freeman, 2012; Tracy & Robins, 2007).

1.3.2 Nonverbal Signals of Prestige

We expect that behaviors known to communicate high communion or warmth will be part of a distinct prestige display. The most prototypical nonverbal signal of communion is smiling, which has been shown to increase perceptions of warmth and liking (Bayes, 1972; Guerrero, 2005; Gifford, 1994; Lau, 1982; Krumhuber et al., 2007), and is used to convey closeness and involvement among interactants (Mehrabian, 1971). Smiling has also been shown to precipitate prosocial behavior (Mehu, Grammer, & Dunbar, 2007) and signal affiliative social motivations (Fridlund, 1991; Kraut & Johnston, 1979). Finally, smiling decreases perceptions of aggression and hostility (Kraus & Chen, 2013), which must be avoided by prestigious individuals (Cheng et al., 2013).

A second potential prestige behavior is upward head tilt, which is also likely to increase perceptions of communion and affiliation. Individuals who tilt their heads upward are perceived as experiencing greater happiness and less sadness (Mignault & Chaudhuri, 2003), both of which increase interpersonal liking (Lyubomirsky, King, & Diener, 2005). Upwards head tilt also increases recognition rates for several positive emotions, including happiness, excitement, and pride (in contrast, shifting one's head downward can decrease recognition of these positive emotions; Beck, Canamero, & Bard, 2010; Tracy & Robins, 2007a, Witkower & Tracy, invited resubmission; Witkower, Tracy, & Lange, in prep). Furthermore, in addition to conveying warmth and communion, an upwards head tilt also automatically and cross-culturally increases

perceptions of high-rank (Bente et al., 2010; Mignault & Chaudhuri, 2003; Rule et al., 2012, but see Hehman et al., 2013). While this last finding could indicate that upwards head tilt should be part of a dominance display as well, the evidence linking this behavior to positive emotions suggests that it is more likely to be a unique signal of prestige.

It is noteworthy that the combination of behaviors hypothesized to be associated with prestige (i.e., expansiveness, smiling, and upwards head tilt) are identical to the combination of behaviors repeatedly found to be critical to the nonverbal expression of pride (Tracy & Robins, 2007; Tracy & Matsumoto, 2008; Tracy & Robins, 2004). This parallel may be due to the strong association between authentic pride—the form of pride based on hard-earned accomplishments and genuine feelings of self-esteem—and prestige (Cheng et al., 2010; Liu, Lu, Yu, Chen, 2012). Although the pride expression has been found to communicate both authentic pride and hubristic pride—the latter being the more arrogant, self-aggrandizing version of the emotion (Tracy & Robins, 2007; Tracy & Prehn, 2012)—there is evidence to suggest that this expression is more strongly associated with authentic pride (Martens, 2014; Martens et al., 2012; Martens & Tracy, 2013; Tracy & Prehn, 2013). Furthermore, several studies suggest that there may also be a somewhat different recognizable display of hubristic pride, which includes different head movements that suggest lower communion (Lange & Crusius, 2015; Nelson & Russell, 2014).

1.3.3 Nonverbal Signals of Dominance

Given that smiling and upwards head tilt communicate warmth and affiliation, we expect dominance to be communicated with the opposite set of behaviors. Specifically, a dominance display is likely to include a reduction or absence of smiling, and head tilted downward. Indeed, studies have found that smiling decreases perceptions of toughness and aggression—both traits associated with dominance (Hess, Beaupré, & Cheung, 2002; Kraus & Chen, 2013)—and tilting

one's head downward increases recognition of negative emotion and decreases recognition of positive emotion (Beck et al., 2010; Mignault & Chaudhuri, 2003, Witkower & Tracy, under review); these effects suggest that head tilt downward may decrease perceptions of communion and affiliation. Furthermore, individuals who are trying to appear intimidating spontaneously tilt their heads downward, and observers reliably perceive this behavior as intimidating (Hehman, Leitner, & Gaertner, 2013). Downward head tilt may even have a specific adaptive function in the context of an agonistic encounter: it might help protect the neck and its jugular vein, one of the most vulnerable parts of the human body (Hehman et al., 2013).

1.4 The Present Research

In sum, we expect that prestige and dominance will be associated with distinct and readily interpreted and distinguished nonverbal displays. More specifically, we predict that displays that include bodily expansion, smiling, and upwards head tilt will be used by prestige strategists to signal their particular form of high rank and thereby increase prestige conferrals, and also by observers to form impressions of targets' prestige. In contrast, displays that include bodily expansiveness, reduced smiling, and a downwards head tilt will be used by dominance strategists to signal their particular form of high rank and thereby increase dominance conferrals, and also by observers to form impressions of targets' dominance.

To test these hypotheses, we conducted five studies using both experimental and correlational methods. In Study 1, we experimentally manipulated head tilt, expansiveness, and smiling of a target individual, and examined observer judgments of dominance and prestige. In Studies 2 and 3, we replicated and extended the results of Study 1 using additional targets. In Study 4, we assessed the nonverbal displays shown spontaneously by individuals working together in small groups, where dominance and prestige hierarchies naturally emerged. We also

assessed emergent perceptions of dominance and prestige made about each group member based on peer ratings, and tested whether these perceptions mapped onto the predicted sets of nonverbal behaviors. Finally, in Study 5 we tested whether these distinct sets of nonverbal behaviors were spontaneously shown by dominant and prestigious individuals outside of the lab: by the two most recent U.S. presidential candidates as they competed for a top leadership position during the three televised U.S. Presidential Debates held in 2016.

Together, these studies are the first to test whether distinctive sets of behaviors are used to communicate dominance and prestige, and to do so by: (a) examining rank judgments made in response to tightly controlled posed nonverbal displays, and (b) assessing the behaviors individuals naturally display while competing with others for rank in a group interaction and in a real-world one-on-one political contest.

2 Study One

The goal of Study 1 was to determine whether the predicted permutations of nonverbal behaviors elicit distinct perceptions of prestige and dominance. We hypothesized that displays with an upwards head tilt, smile, and expansive posture would be perceived as prestigious, whereas displays with a downwards head tilt, no smile, and expansive posture would be perceived as dominant. We also assessed liking and perceived influence of targets, to test whether behaviors associated with prestige and dominance were also associated with increased or decreased liking, and increased influence, as expected.

2.1 Method

2.1.1 Participants

One hundred and forty-four U.S. workers were recruited from Amazon Mechanical Turk (MTurk). Twenty-three participants were excluded because they failed the attention-check item. The final sample thus consisted of 121 participants (55% male; M age = 33.23 years; SD = 10.33 years; 86% Caucasian). Given our within-subjects design, this sample size provided adequate power to detect meaningful effects.

2.1.2 Materials

2.1.2.1 Stimuli

Stimuli were generated using Poser Pro 2014 software. Computer-generated avatars provide a highly controlled environment where precise manipulations of behaviors can be made without any incidental movements; they also allow for the control of potentially relevant human features like attractiveness. A generic male character with an average-to-athletic build and no unusual distinguishing features was used for all stimuli in Studies 1 and 2 (see Figure 1). Each display

was systematically manipulated to vary on three nonverbal behavior dimensions: expansiveness (expansive versus neutral), smiling[3] (smile versus no smile), and head angle (tilted upward, level, downward). Expansiveness was operationalized by the arms extended out from the body and hands placed on the hips to expose the chest. Head angle (i.e., head pitch, or AU 53 and 54 of the Facial Action Coding System; Ekman et al., 2002) was adjusted to be 10 degrees upward or downward, with eye gaze directed towards the camera as if posers were looking at an observer. In total, 12 displays were constructed by varying each of these three behaviors into all possible permutations.

Figure 1. Examples of Stimuli from Studies 1 and 2

Figure 1. Examples of stimuli used in Studies 1 and 2. In Study 2, these stimuli were used as the "happiness" (top left), "prestige" (top right), "neutral" (bottom left), and "dominance" (bottom right) conditions.

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[3] Smiling was based on movement created from activation of the Zygomatic major muscle, outlined by elongated and angled lip corners, raised infraorbital triangle, and deepening of the nasolabial furrow (AU12).

2.1.2.2 Perceptions of Prestige and Dominance

Participants evaluated the perceived prestige and dominance of each target using a shortened version of the previously validated Prestige and Dominance scales (Cheng et al., 2010); these items were chosen because they had the highest factor loadings on each dimension across the two studies that were used to validate the full scale (See Cheng et al., 2010). Specifically, prestige was measured with the four items: "This person would be considered an expert on some matters", "This person's unique talents and abilities would be recognized by others", "People would seek this person's advice on a variety of matters", and "Members of this person's group respect and admire him" (inter-item αs across targets $\geq$ .88). Dominance was measured with the following four items: "This person would enjoy having control over others", "This person would be willing to use aggressive tactics to get their way", "This person would often try to get his way regardless of what people may want", and "This person would try to control others rather than permit them to control him" (inter-item αs across targets $\geq$ .92). Participants rated each item on a 7-point Likert scale ranging from 1 (Not at all) to 7 (Very much).

2.1.2.3 Liking

Liking was measured with a single item "I would like this person", on a 7-point Likert scale ranging from 1 (Not at all) to 7 (Very much).

2.1.2.4 Social Influence

Perceptions of social influence were measured with three items adapted from past research (Cheng et al., 2013): "I would pay attention to this person", "This person is a leader", and "This person is influential". Participants rated each item on a 7-point Likert scale ranging from 1 (Not at all) to 7 (Very much).

2.1.3 Procedure

Participants viewed all 12 nonverbal displays in a randomized order, and rated each on prestige, dominance, liking, and influence in a self-paced manner. They then completed an attention check measure used in past research (see Appendix A; Hauser & Schwarz, 2016; Oppenheimer, Meyvis, & Davidenko, 2009), before being debriefed and compensated.

2.2 Results

2.2.1 Perceptions of Prestige

We first conducted a 2 (expansiveness) X 2 (smiling) X 3 (head tilt) repeated-measures ANOVA on perceptions of prestige.[4] Supporting our hypotheses, main effects emerged for smiling, $F(1, 120) = 4.67$, $p = .03$, $\eta_p^2 = .04$, expansiveness, $F(1, 120) = 41.61$, $p < .001$, $\eta_p^2 = .26$, and head tilt, $F(2, 240) = 41.41$, $p < .001$, $\eta_p^2 = .26$, suggesting that prestige perceptions increased as targets displayed a smile ($M = 4.57$, SE = .08 vs. $M = 4.42$, $SE = .08$), expansiveness ($M = 4.70$, $SE = .08$ vs. $M = 4.28$, $SE = .08$), and head tilted upward or level ($M = 4.67$, SD = .08 vs. $M = 4.64$, $SE = .08$ for level head and $M = 4.16$, $SE = .08$ for head tilted downward, both corrected pairwise comparisons < .001). No significant difference emerged between targets with heads tilted upward versus level ($p > .99$). The target displaying the configuration of most prestigious components was judged as most prestigious overall ($M = 5.00$; see Table 1).

These main effects were qualified by a head tilt by expansiveness interaction, $F(2, 242) = 5.86$, $p = .003$, $\eta_p^2 = .05$, as well as a 3-way interaction with smiling, $F(2, 242) = 5.19$, $p = .006$, $\eta_p^2 = .04$, indicating that when targets were not smiling, upwards head tilt significantly increased perceptions of prestige ($p = .001$), but only if targets were also displaying expansiveness,

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[4] Throughout Studies 1-5, Bonferroni corrected pairwise comparisons were performed whenever more than two conditions were compared.

$F(2,240) = 11.24, p < .001, \eta_p^2 = .09$. When non-smiling targets were also not expansive, upwards head tilt decreased perceptions of prestige compared to a neutral head angle ($p = .03$), and did not differ significantly from downwards head tilt ($p = .13$). These results suggest that upwards head tilt increases or maintains perceptions of prestige, compared to a level head, if it is paired with at least one other nonverbal behavior relevant to prestige (e.g., smiling, expansiveness, or both smiling and expansiveness).

2.2.2 Perceptions of Dominance

We next conducted a similar 2 (expansiveness) X 2 (smiling) X 3 (head tilt) repeated-measures analysis of variance (ANOVA) on perceptions of dominance. Supporting our hypotheses, main effects emerged for expansiveness, $F(1, 120) = 42.39, p < .001, \eta_p^2 = .26$, smiling, $F(1, 120) = 56.73, p < .001, \eta_p^2 = .32$, and head tilt, $F(2, 240) = 60.08, p < .001, \eta_p^2 = .33$, indicating that dominance perceptions increased as targets showed increased expansiveness ($M = 4.56, SE = .09$ vs. $M = 4.08, SE = .09, p < .001$), no smile ($M = 4.63, SE = .09$ vs. $M = 4.02, SE = .09, p < .001$), and head tilt downward ($M = 4.88, SE = .10$ vs. $M = 4.11, SE = .10$ for head level, $M = 3.99, SE = .10$ for head tilted upward; $ps < .001$). Again, no significant difference emerged between targets with their head tilted up versus level ($p = .10$). The target displaying the configuration of most dominant features (i.e., expansiveness, no smile, and a downwards head tilt) was perceived as most dominant overall ($M = 5.15$). Although 2-way interactions emerged between smiling and head tilt, $F(2,240) = 8.82, p < .001, \eta_p^2 = .07$, and expansiveness and head tilt, $F(2,240) = 7.56, p = .001, \eta_p^2 = .06$, these effects did not eliminate or reverse the main effect of downward head tilt on perceptions of dominance ($ps < .001$; for more detail see Appendix B).

2.2.3 Perceptions of Influence

We next conducted a 2 (expansiveness) X 2 (smiling) X 3 (head tilt) repeated-measures analysis of variance (ANOVA) on perceptions of influence. Main effects emerged for expansiveness, $F(1, 120) = 74.79$, $p < .001$, $\eta_p^2 = .38$, smiling, $F(1,120) = 26.57$, $p < .001$, $\eta_p^2 = .18$, and head tilt, $F(2, 240) = 8.62$, $p < .001$, $\eta_p^2 = .07$, indicating that perceptions of influence increased as targets showed greater expansiveness ($M = 4.63$, $SE = .07$ vs. $M = 4.18$, $SE = .07$, $p < .001$), no smile ($M = 4.52$, $SE = .07$ vs. $M = 4.30$, $SE = .07$, $p < .001$), and head tilt downward ($M = 4.52$, $SE = .07$ vs. $M = 4.37$, $SE = .07$ for head level, $M = 4.33$, $SE = .07$ for head tilted upward; p's $\leq .02$). Again no significant differences emerged between targets with head tilted up versus level ($p = .84$). We also found a 2-way interaction between head tilt and expansiveness, $F(2,240) = 6.69$, $p < .001$, $\eta_p^2 = .05$, indicating that when targets were not expansive head tilt significantly affected perceptions of influence, $F(2, 240) = 11.62$, $p < .001$, $\eta_p^2 = .09$, such that non-expansive targets were perceived as more influential when they tilted their head down ($ps \leq .006$). In contrast, when targets were expansive, head angle did not significantly alter perceptions of influence, $F(2, 240) = 1.21$, $p = .30$, $\eta_p^2 = .01$. This interaction may be the result of a ceiling effect; as average perceptions of influence rise as a function of expansiveness, the potential impact of head tilt is reduced.

2.2.4 Liking

Finally, we conducted a 2 (expansiveness) X 2 (smiling) X 3 (head tilt) repeated-measures ANOVA on perceptions of liking. Supporting our hypotheses, main effects emerged for smiling, $F(1,120) = 21.34$, $p < .001$, $\eta_p^2 = .15$, and head tilt, $F(2, 240) = 78.86$, $p < .001$, $\eta_p^2 = .40$, suggesting that liking increased as targets displayed a smile ($M = 4.36$, $SE = .09$ vs. $M = 4.36$, $SE = .08$), and decreased when the head was tilted downward ($M = 3.57$, $SE = .10$ vs. $M = 4.40$, $SE = .08$ for

level head and M = 4.50, SD = .08 for head up, *ps* < .001). No significant difference emerged between targets with heads tilted upward versus level (*p* = .26). Consistent with our expectation that expansiveness is linked to agency but not communion, no main effect of expansiveness emerged on liking, $F(1, 120) = .77$, $p = .38$, $\eta_p^2 = .01$.

Although we also found 2-way interactions between head tilt and smiling, $F(2,240) = 6.06$, $p = .003$, $\eta_p^2 = .04$, and head tilt and expansiveness, $F(2,240) = 3.71$, $p = .03$, $\eta_p^2 = .03$, as well as a 3-way interaction between head tilt, smiling, and expansiveness, $F(2,240) = 5.38$, $p = .005$, $\eta_p^2 = .04$, these effects did not eliminate or reverse the effect of a downwards head tilt, which always decreased perceptions of liking when compared to a neutral and upwards head tilt, regardless of smiling and expansiveness (*ps* ≤ .001; see Appendix A for more details).

Table 1 Perceptions of Nonverbal Displays included in Study 1.

Display #	Smile	Expansive	Head Tilt	Dominance (α)	Prestige (α)	Liking	Influence(α)
1	No	No	Down	4.94^{ab} (.94)	4.00^{f} (.90)	3.50^{f}	4.47^{bc} (.81)
2	No	No	Level	4.08^{e} (.94)	4.43^{cd} (.92)	4.26^{cd}	4.26^{d} (.79)
3	No	No	Up	4.08^{e} (.93)	4.19^{ef} (.91)	4.02^{e}	4.14^{de} (.83)
4	**No**	**Yes**	**Down**	$\mathbf{5.15^{a}}$ (.92)	$\mathbf{4.30^{de}}$ (.89)	$\mathbf{3.50^{f}}$	$\mathbf{4.72^{a}}$ (.82)
5	No	Yes	Level	4.88^{b} (.93)	4.64^{b} (.89)	4.03^{de}	4.76^{a} (.82)
6	No	Yes	Up	4.61^{cd} (.93)	4.93^{a} (.90)	4.39^{bc}	4.77^{a} (.80)
7	Yes	No	Down	4.56^{d} (.94)	3.95^{f} (.94)	3.49^{f}	4.26^{d} (.84)
8	Yes	No	Level	3.49^{f} (.94)	4.55^{bc} (.92)	4.67^{a}	4.02^{e} (.86)
9	Yes	No	Up	3.35^{f} (.93)	4.56^{bc} (.92)	4.84^{a}	3.95^{e} (.86)
10	Yes	Yes	Down	4.86^{bc} (.95)	4.40^{cd} (.92)	3.79^{e}	4.63^{ab} (.83)
11	Yes	Yes	Level	3.97^{e} (.93)	4.93^{a} (.92)	4.63^{ab}	4.45^{c} (.86)
12	**Yes**	**Yes**	**Up**	$\mathbf{3.91^{e}}$ (.94)	$\mathbf{5.00^{a}}$ (.88)	$\mathbf{4.78^{a}}$	$\mathbf{4.45^{c}}$ (.87)

Note. Dominance and prestige displays used in subsequent studies are in bold. Cronbach's alpha is presented in parentheses. Superscripts are based on 95% CI, with shared superscripts indicating no significant difference, $p < .05$.

2.3 Discussion

Results from Study 1 support our main hypotheses: targets displaying expansiveness, a smile, and head tilted upward were perceived as most prestigious, whereas targets displaying expansiveness, no smile, and head tilted downward were perceived as most dominant. Also consistent with our expectations, expansiveness was perceived as conveying influence but not altering liking, smiling increased liking, and downwards head tilt led to disliking but increased influence. These results are consistent with the expectation that the combination of expansiveness, upwards head tilt, and smiling increases perceptions of prestige by virtue of simultaneously increasing likeability and influence. In contrast, a downwards head tilt combined with an absent smile and expansiveness appears to communicate dominance by virtue of decreasing likeability and increasing influence.

Interestingly, downwards head tilt appeared to increase perceptions of influence more than upwards head tilt or a neutral head angle. This finding could indicate that dominance displays more powerfully affect perceptions of social influence than do prestige displays, but it is also possible that upwards head tilt is simply a less powerful signal of prestige than downwards head tilt is of dominance. Indeed, the absence of significant differences between upwards head tilt and level head in predicting prestige or influence is consistent with this interpretation, as is the finding that upwards head tilt conveys prestige only when viewed in combination with another behavioral indicator of prestige (i.e., expansiveness or smiling).

3 Study Two

In Study 2 we sought to test whether the two configurations of behavioral components that were found in Study 1 to convey prestige and dominance, respectively, are perceived as distinct signals. More specifically, we tested whether the prestige display found in Study 1 is judged as significantly more prestigious than the dominance display and two control conditions (i.e., targets with neutral head and body postures, one smiling and one not), and whether the dominance display found in Study 1 is judged as significantly more dominant than the prestige display and two control conditions.

3.1 Method

3.1.1 Participants

One hundred and twenty-six U.S. workers were recruited from MTurk. Fourteen participants were excluded because they failed an attention-check item. A power analysis using G*Power was conducted to determine the necessary sample size that would ensure 80% power to detect the smallest effect likely given the means and standard deviations uncovered in Study 1 (i.e., the difference in perceptions of prestige from the prestige display versus the happiness display; $f =$ .20), assuming traditional power estimation parameters (correlation among repeated measures = .50, alpha = .0125 planning a Bonferroni correction, and no correction for sphericity). This analysis suggested that we needed fewer than 50 participants; however, following recommendations from Simmons (2014), we elected to collect more than twice this required sample, resulting in a final sample of 112 participants (55% male). Participants were roughly the same age as in Study 1 ($M = 35.21$ years; $SD = 11.50$ years), and primarily Caucasian (82.1%).

3.1.2 Materials

3.1.2.1 Stimuli

Four (of the 12) stimuli used in Study 1 were selected for inclusion (see Figure 1). The

dominance display portrayed expansiveness, no smile, and head tilted downward. The prestige

display portrayed expansiveness, a slight smile, and head tilted upwards. These two displays

were selected based on our hypotheses and the results of Study 1 showing that they were judged

as most dominant and prestigious, respectively. We also included two control displays: one

featured the target with no expansiveness, no smile, and his head at a neutral angle (i.e., a neutral

expression), and the other featured the target with no expansiveness, smiling, and his head at a

neutral angle (i.e., a happiness expression). The neutral condition was included to ensure that the

prestige and dominance displays increased perceptions of prestige and dominance, respectively,

compared to a baseline neutral display. The happiness expression was included to ensure that the

prestige display would elicit greater impressions of prestige compared to happiness; that is, that

prestige perceptions observed in Study 1 were not merely a result of the strong affiliative

message sent by the presence of a smile.

3.1.2.2 Perceptions of Prestige and Dominance

Participants judged each target's prestige (inter-item αs across targets $\geq$ .88) and dominance

(inter-item αs across targets $\geq$ .91) using the same scales as in Study 1.

3.1.2.3 Perceptions of Agency and Communion

To more comprehensively assess agency and communion than in Study 1, we added several

items to the social influence and liking scales used there. Specifically, in addition to the

researcher-generated items used to measure social influence in Study 1, participants indicated

how "Self-Assured", "Assertive", and "Self-confident" they perceived each target to be, based

on items taken from the interpersonal circumplex (Wiggins, 1979; Wiggins et al., 1988). All six items were averaged together to form a single measure of agency (αs across targets $\geq$ .89). Similarly, we combined the single-item measure of liking used Study 1 with four new items assessing communion from the interpersonal circumplex (Wiggins, 1979; Wiggins et al., 1988): "Tender", "Accommodating", "Gentlehearted", and "Kind". All five items were averaged together to form a single measure of communion (αs across targets $\geq$ .87).

3.1.3 Procedure

Participants viewed all four nonverbal displays (dominance, prestige, neutral, happy) presented in a random order, and provided ratings of prestige, dominance, agency, and communion for each display. Due to differences in item stems, dominance and prestige items were intermixed (in a random order), as were agency and communion items. Participants then completed the same attention check item used in Study 1 before being debriefed and compensated for their time.

3.2 Results

3.2.1 Perceptions of Prestige

We first conducted a one-way repeated measures analysis of variance (ANOVA) on perceptions of prestige. Supporting our hypothesis, the prestige display was perceived as significantly more prestigious than each of the other displays, $F(3,333) = 15.39$, $p < .001$, $\eta_p^2 = .12$, all ds $\geq$ .46; see Figure 2. Importantly, the dominance display was perceived as no more prestigious than the neutral or happy display (p's $\geq$ .99, $d \leq$ .11), suggesting that the signal sent by the prestige display is distinct to that display. In addition, the happy display was not perceived as significantly different in prestige compared to the neutral display ($p = .24$, $d = .17$), suggesting that participants do not simply infer prestige from the presence of a smile. No participant sex by

nonverbal display interaction emerged, suggesting that these effects did not vary by participant sex, $F(3,330) = .36$, $p = .76$, $\eta_p^2 = .003$.

3.2.2 Perceptions of Dominance

Next, we conducted a one-way repeated measures analysis of variance (ANOVA) on perceptions of dominance. Again supporting our hypotheses, the dominance display was perceived as significantly more dominant than each of the other displays, $F(3,333) = 37.05$, $p < .001$, $\eta_p^2 = .25$, all ds $\geq .79$; see Figure 2. Importantly, the prestige display was perceived as no more dominant than the neutral or happy display (ds $\leq .25$ ps $\geq .13$), suggesting that the signal sent by the dominance display is distinct to that display. A significant difference in dominance perceptions also emerged between the happy display and the neutral display ($d = .37$, $p < .003$), indicating that smiling reduces perceptions of dominance. No participant sex by nonverbal display interaction emerged, $F(3,330) = .31$, $p = .81$, $\eta_p^2 = .003$.

Figure 2. Perceptions of Dominance and Prestige, Study 2
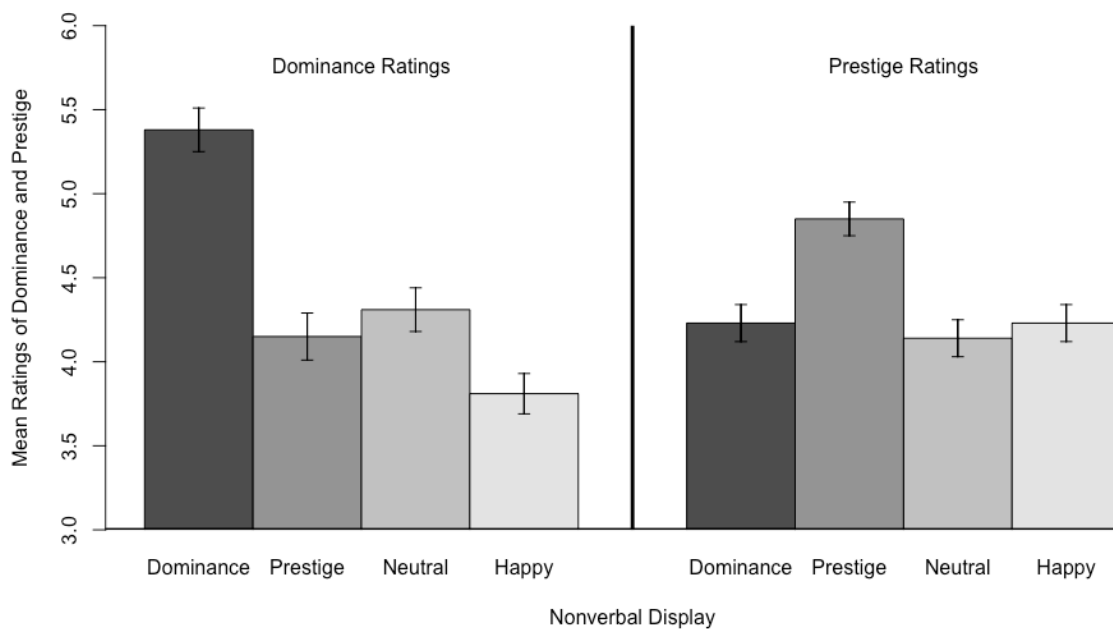
Note. Error bars indicate +/- 1SE.

3.2.3 Perceptions of Agency

We next conducted a one-way repeated measures analysis of variance (ANOVA) on perceptions of agency. Supporting our hypotheses, the prestige display was perceived as significantly more agentic than the neutral display and the happy display, $F(3,333) = 24.37$ $p < .001$, $\eta_p^2=.18$, , both $ds \geq .62$; see Figure 3. The dominance display was also perceived as significantly more agentic than the neutral display and the happy display, $ps < .001$, both $ds \geq .52$. Most important, the prestige and dominance displays were not perceived as significantly different from each other in agency, $p > .99$, $d = .09$, suggesting that both displays were considered to be highly agentic. Notably, this finding deviates from the result, in Study 1, that nonverbal behaviors specific to the dominance display were judged as more influential than nonverbal behaviors specific to the prestige display (i.e., no smile was more influential than smiling, and head tilt down was more influential than head tilt up or level). This divergence may be due to the relatively greater power of the configuration of components in the prestige display when presented in combination with each other (whereas dominance display components may hold greater or equal power when presented separately), or to the more comprehensive measure of influence—which included items assessing agency—used here. Again, we found no participant sex by nonverbal display interaction, $F(3,330) = .60$, $p = .60$, $\eta_p^2=.005$.

3.2.4 Perceptions of Communion

Finally, we conducted a one-way repeated measures analysis of variance (ANOVA) on perceptions of communion. Supporting our hypotheses, the prestige display was perceived as significantly higher in communion compared to the neutral display and the dominance display, $F(3,333) = 54.52$, $p < .001$, $\eta_p^2=.33$, both $ps < .001$, $ds \geq .42$, but no different in communion from the happiness display, $p = .44$, $d = .17$; see Figure 3. In contrast, the dominance display was

perceived as significantly lower in communion compared to all other displays, all *ps* < .001, *ds* ≥

.56, supporting the expectation that the prestige and dominance displays differ in communion.

Again no participant sex by nonverbal display interaction emerged, $F(3,330) = .17$, $p = .92$,

$\eta_p^2 = .001$.

Figure 3. Perceptions of Agency and Communion for each Nonverbal Display in Study 2.
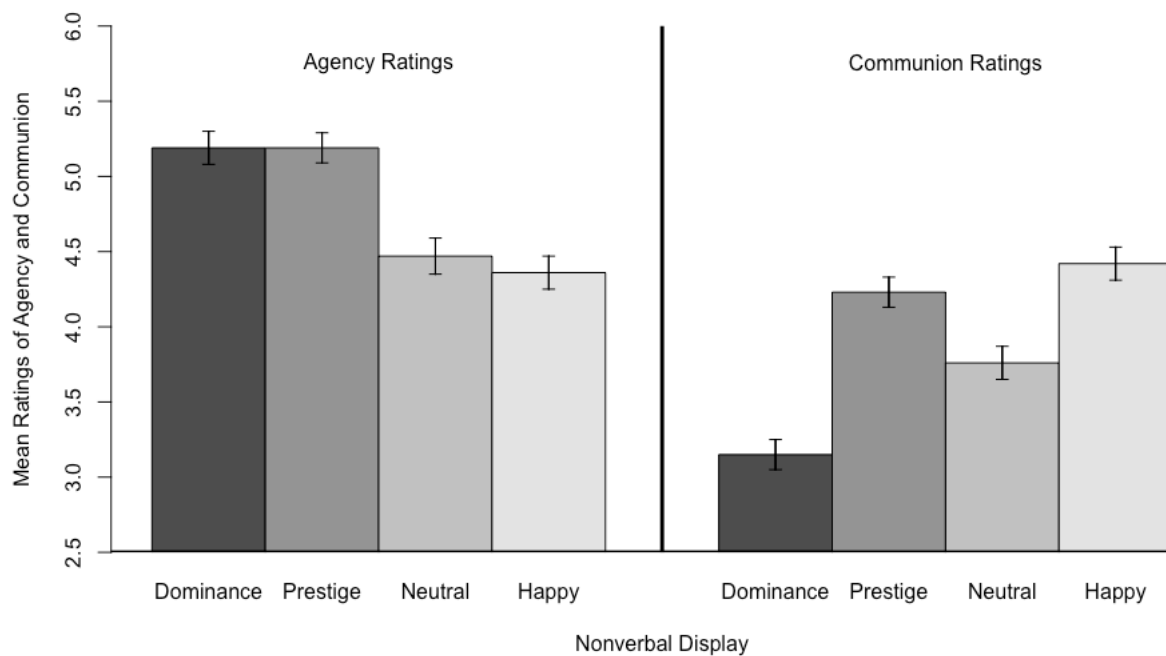
Note. Error bars indicate +/- 1SE.

3.3 Discussion

Results from Study 2 provide strong support for our hypotheses. The prestige display

(expansiveness, smiling, head tilted upward) was perceived as more prestigious than the

dominance display, and also more prestigious than the two control displays. In addition, the

dominance display (expansiveness, no smile, head tilted downward) was perceived as more

dominant than the prestige display, and also more dominant than the two controls. The

dominance and prestige display were both perceived as significantly more agentic than the two

controls, but not significantly different in agency from each other—suggesting that both displays, like the two strategies, communicate high rank. Finally, the dominance display was perceived as lower in communion than the prestige display and both controls, supporting the expectation that dominant individuals attain influence despite—or partly because of—the dislike they engender in others. In contrast, the prestigious target was seen as highly communal, indicating that prestigious individuals are liked and that their influence may be partly predicated on their high levels of communion.

4 Study Three

Although Studies 1 and 2 support our hypothesis that the prestige and dominance rank attainment strategies are associated with distinct nonverbal displays, both studies relied on perceptions made about computer-generated avatars, rather than actual humans. In Study 3 we sought to test whether these results would generalize to human targets, which provide greater ecological validity, and also whether target gender would influence perceptions. Given that men tend to engage in more aggressive behavior (Barlett & Coyne, 2014; Bettencourt & Miller, 1996; Archer & Lloyd, 1985) and are lower in communion (Abele, 2003; Diekman, Clark, Johnston, Brown, & Steinberg, 2011) – a pattern stereotypic of dominance – one might expect dominance to be a male strategy, and perceptions of each strategy to vary depending on the gender of the target showing the display. However, prior studies on dominance and prestige have found that both strategies are used effectively by and among men and women (Cheng et al., 2013; Maner & Case, 2016). Given these findings, as well as the finding from both Studies 1 and 2 that the prestige display reliably communicated prestige when shown by a male (avatar) target, we did not expect to observe gender differences in the signals sent by these two displays.

4.1 Method

4.1.1 Participants

Two hundred and eighty-five U.S. workers were recruited from MTurk. A power analysis using G*Power was conducted to determine the necessary sample size that would ensure 80% power to detect the smallest effect given the means and standard deviations akin to that observed in Study 1, rather than the larger effect size observed in Study 2 (i.e., $f = .20$ for the difference between prestige ratings made about the prestige versus happy display) assuming traditional power

estimation parameters (correlation among repeated measures = .50, alpha = .0125 planning a Bonferroni correction, and no correction for sphericity). This analysis suggested that we needed fewer than 100 people, but given that we were using new stimuli and less tightly controlled human targets, we opted to include a substantially larger sample, again following recommendation from Simmons (2014). After sixty-five participants were excluded for failing attention-check item, the final sample consisted of 220 participants (50% male). Participants were roughly the same age as in Studies 1 and 2 (M = 34.49 years; SD = 11.17 years), and also primarily Caucasian (78.6%).

4.1.2 Materials

4.1.2.1 Stimuli

One male and one female actor posed nonverbal displays of prestige, dominance, a neutral expression, and happiness. Actors wore a plain white t-shirt and jeans, and were photographed from just below the waist to above the head. Both actors were asked to remove jewelry and eyewear. Both actors were Caucasian, to match the expected demographic of our sample.

Actors posed four displays (shown in Figure 4) following detailed verbal instructions provided by the first author: prestige (expansiveness, smiling, and head tilt up), dominance (expansiveness, no smile, head tilt down), neutral (neutral bodily expansion, no smile, level head angle), and happiness (neutral bodily expansion, smiling, level head angle). Expansiveness was operationalized as standing up straight, holding one's arms away from the body, hands on the hips, and expanded chest, in line with past research (Hall et al., 2005; Tracy & Robins, 2007).

Figure 4. Prestige, Happiness, Dominance, and Neutral Expression Stimuli used in Study 3

Note. Images include Prestige, Happiness, Dominance, and Neutral Expression (in order from left to right).

4.1.2.2 Measures

Participants indicated their judgments of prestige (αs across targets $\geq$ .84) and dominance (αs across targets $\geq$ .88) using the same items and rating scale as was used in Studies 1 and 2, and indicated perceptions of agency (αs across targets $\geq$ .84) and communion (αs across targets $\geq$ .90) using the same items and rating scale as was used in Study 2.

4.1.3 Procedure

Participants viewed four nonverbal displays posed by a target individual matched to their own gender, and for each display provided ratings of prestige, dominance, agency, and communion. Participants viewed and judged same-sex targets only to minimize possible effects of physical attraction, given that high-rank displays could cause participants to view targets more favorably

and bias judgments. Participants then completed the same attention check item used in Studies 1

and 2, before being debriefed and compensated.

4.2 Results

4.2.1 Perceptions of Prestige

We first conducted a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance

(ANOVA) on perceptions of prestige. (Because participants viewed targets of their own sex

only, all sex effects are potentially due to both target and perceiver, which were completely

confounded). Supporting our hypotheses, a main effect emerged for display type, $F(3,654) =$

98.94, $p < .001$, $\eta_p^2 = .31$, indicating that prestige perceptions were highest for the prestige display

when compared to all other displays (See Figure 5; $ps \leq .028$, $ds \geq .18$). No main effect of sex

emerged, $F(1,218) = 2.70$, $p = .10$, $\eta_p^2 = .01$, nor was there a sex by display interaction, $F(3,654) =$

.14, $p = .90$, $\eta_p^2 = .001$).

Figure 5. Effect of Nonverbal Display on Perceptions of Prestige, Study 3.
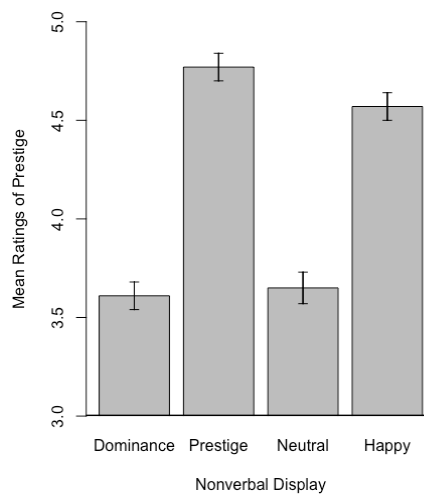
Note. Error bars indicate +/- 1SE.

4.2.2 Perceptions of Dominance

We next conducted a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance

(ANOVA) on perceptions of dominance. Supporting our hypotheses, a main effect emerged for

nonverbal display, $F(3,654) = 100.48$, $p < .001$, $\eta_p^2 = .32$, indicating that dominance perceptions

were highest for the dominance display compared to all other displays ($ps < .001$; ds $\geq .92$; see

Figure 6). A main effect also emerged for sex, $F(1, 218) = 33.08$, $p < .001$, $\eta_p^2 = .13$, indicating

that the male target was perceived as more dominant than the female target.

Although we also found a 2-way interaction between sex and display type, $F(3,654) =$

11.21, $p < .001$, $\eta_p^2 = .05$, the dominance display was always judged to be significantly more

dominant than all other displays regardless of gender ($ps < .001$, ds $\geq .77$; for more detail, see

Figure 6 and SOM).

Figure 6. Sex by Display Interaction Predicting Dominance, Study 3.
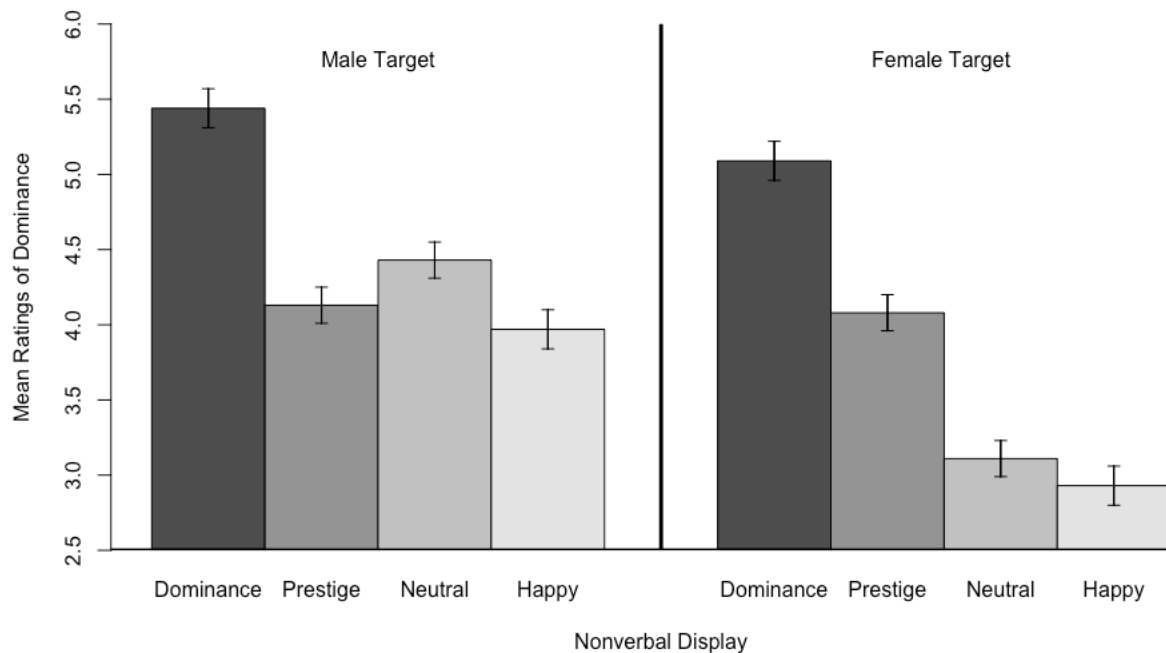

Note. Error bars indicate +/- 1SE.

4.2.3 Perceptions of Agency

We next conducted a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance (ANOVA) on perceptions of agency. Main effects emerged for display, $F(3,654) = 99.49$, $p < .001$, $\eta_p^2 = .31$, and target sex, $F(1,218) = 5.41$, $p = .02$, $\eta_p^2 = .02$, but these effects were qualified by a 2-way interaction between sex and display, $F(3,654) = 8.19$, $p < .001$, $\eta_p^2 = .04$, indicating that the prestige display was perceived as significantly more agentic than both the happy and neutral display for both women and men ($ps \leq .001$, $ds \geq .38$), but the dominance display was perceived as significantly more agentic than the happy display for women only ($p = .002$, $d = .43$); among men, the dominance display was judged to be no more agentic than the happy display, $p > .99$, $d = -.16$. The male dominance display was, however, considered more agentic than neutral (for both females and males $ps < .001$, $ds \geq .66$; for all means and SE, see SOM).

4.2.4 Perceptions of Communion

Finally, a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance (ANOVA) was conducted on perceptions of communion. Main effects emerged for display, $F(3,654) = 209.98$, $p < .001$, $\eta_p^2 = .49$, and sex, $F(1,218) = 26.65$, $p < .001$, $\eta_p^2 = .11$, but these were qualified by a sex by display interaction, $F(3,654) = 6.83$, $p < .001$, $\eta_p^2 = .03$. Deconstructing this interaction indicated that among both men and women, the dominance display was perceived as significantly lower in communion compared to all other displays ($ps < .001$, $ds \geq .51$), and the prestige display as significantly higher in communion compared to the dominance and neutral displays ($ps < .001$, $ds \geq .45$), but among women the prestige display was perceived as lower in communion than the happy display ($p < .001$, $d = .58$), whereas for men these two displays did not differ ($p = .84$, $d = .10$; for all means and SE, see Appendix C).

4.3 Discussion

Study 3 demonstrated that the distinct nonverbal displays of prestige and dominance uncovered in Studies 1 and 2 are perceived distinctively as conveying prestige and dominance when shown by human posers of both genders. More specifically, the prestige display (i.e., expansiveness, smile, head tilted up) was judged to be significantly more prestigious than the dominance display (i.e., expansiveness, no smile, head tilted down) and both controls, and this effect did not vary by gender. Similarly, the dominance display was judged to be significantly more dominant than the prestige display and both controls, and this effect also emerged among both men and women.

One unexpected result did emerge, however; among men, the dominance display was perceived as no more agentic than the happiness display. This result is inconsistent with our hypotheses and with the results of Studies 1 and 2, which also used a male display (and no perceiver gender differences emerged). One possible explanation is that participants interpreted the smiling human male target as possessing license (i.e., rank) to smile freely (Hecht & LaFrance, 1998), but (correctly) chose not to make similar attributions of license to a computer-generated male in our prior studies. Another possibility is that male observers felt competitive with the dominance-displaying human male target, and judged him as low in agency as a way of "taking him down a notch". Regardless of this issue—which warrants future research investigation—the present results indicate that the dominance display does elicit greater perceptions of dominance than the most relevant comparison displays. In other words, although smiling may increase the appearance of agency in male displayers, when compared to a neutral display, the dominance display is a reliable signal of dominance.

5 Study Four

Studies 1-3 provide the first evidence that prestige and dominance are associated with distinct nonverbal displays, which are reliably discriminated from each other. In Study 4 we sought to determine whether these displays are spontaneously shown during ecologically valid rank contests by individuals who emerge as prestigious and dominant in their social groups. We further examined whether these displays play a role in shaping peers' impressions of displayers' prestige and dominance, and, as a result, promote agency and social influence. To do so, we coded the nonverbal displays shown by individuals engaging in a group task, in which hierarchies naturally emerged (see Cheng et al., 2013). We predicted that individuals who spontaneously displayed expansiveness, smiling, and an upwards head tilt would emerge as prestigious, whereas individuals who spontaneously displayed expansiveness, no smile, and a downwards head tilt would emerge as dominant. We further predicted that both sets of behaviors would indirectly predict displayers' emergent social influence, as judged by his or her peers in the group, and by outside observers who did not participate in the task but later watched videos of the interactions. We finally predicted that any observed effects of prestige and dominance displays on social rank outcomes would be mediated by perceptions of prestige and dominance.

5.1 Method

5.1.1 Participants

One hundred, ninety-one students at the University of British Columbia (53% male) were randomly assigned to one of 36 same-sex groups (19 all-male groups, 17 all-female groups). Group sizes ranged from four to seven people ($M = 5.34$, $SD = .83$), and all participants were previously unacquainted with each other. All participants were paid for their participation. These

data come out of a larger project reported in Cheng and colleagues (2013), which reported separate analyses and addressed different questions about dominance and prestige.

5.1.2 Procedure

Participants first completed a decision-making task, known as "Lost on the Moon," independently, and then worked collectively as a group for 20 minutes on the same task. They were instructed to use their answers from the independent task to guide group interactions. Specifically, participants were asked to rank-order fifteen items (e.g., oxygen tanks, heating unit) in order of their utility for surviving a crash landing on the moon (Bottger, 1984). All group interactions were recorded with video cameras mounted on two tripods on either side of the table. Participants were incentivized such that every member of high-performing groups would receive a $5 bonus in addition to their $10 compensation for participating in the study. However, at the end of the study all participants were told that their group had performed well and were provided with a bonus. Before the conclusion of the study, participants privately rated each group member on several measures in a round-robin design. Finally, participants were debriefed and thanked for their time.

5.1.3 Measures

5.1.3.1 Nonverbal behavior

Eight different time-points were selected from the video-recorded group interactions and subsequently coded for nonverbal behaviors. A research assistant blind to hypotheses selected six segments from each group interaction (all segments were 20 seconds in length), during which a key decision was made by the group. Additionally, a 20-second clip from the first moments of the interaction and a 20-second clip from the final moments of the interaction (when participants received positive feedback about their group performance) were selected for all participants.

Two research assistants watched these eight 20-second video-recordings and rated each participant on the intensity of several nonverbal behaviors. Sound was muted to focus on information in the visual stream during the coding process.

Coders rated nonverbal behaviors related to the dominance and prestige displays documented in Studies 1, 2, and 3: expansiveness (assessed via the items: chest expanded, arms extended out from body, wide or expansive display, body occupying much space; inter-item α = .84), head tilt upward, head tilt downward, and degree of smiling. By aggregating across several expansiveness items we obtained a more comprehensive index of this behavior. However, in addition to testing our primary hypotheses using this aggregated measure of expansiveness, we also conducted exploratory analyses to test whether dominance and prestige strategies might be associated with distinct forms of expansive behaviors. Coders rated the intensity of each nonverbal behavior on a scale ranging from 0 (*Not at all present)* to 1 (*Visible but very mild intensity)* to 5 (*Extreme intensity)*, based on Tracy and Matsumoto (2008). Participants' final scores for each behavior were computed by summing, within each coder, ratings for that item across all 20-second clips of that participant, then averaging across both coders (interrater $\alpha \geq$ .71 for all coded behaviors).

5.1.3.2 Round-robin peer ratings

Upon completion of the group task, participants rated each other group member on a number of measures (i.e., prestige, dominance, social influence, and liking), on a scale ranging from 1 (not at all) to 7 (very much). All ratings were analyzed using SOREMO (Kenny 1998) to implement the social relations model (Kenny & La Voie, 1984). We focused on target effects, which capture each target's average rating (i.e., on average, how was a specific target perceived by all other

group members) after statistically removing idiosyncratic perceiver and dyadic relationship biases.

5.1.3.2.1 Prestige and Dominance

Participants rated the perceived prestige and dominance of each group member using the Prestige and Dominance Peer Rating Scales (Cheng et al., 2010) see http://ubc-emotionlab.ca/research-tools/dominance-prestigescales/). However, one item ("members of your group do not want to be like him/her") was excluded because it is less suited for briefly acquainted group members.

5.1.3.2.2 Agency and Communion

Agency was assessed with three items from the Revised Interpersonal Adjective Scales: "assertive", "self-confident", and "timid" (reverse scored; Wiggins et al., 1988). Communion was assessed with two items: "unsympathetic" (reverse scored) and "softhearted".

5.1.3.2.3 Liking

Liking was assessed with two items: "I like this person" and "I like working with this person".

5.1.3.2.4 Social Influence

Unlike in Studies 2 and 3, we examined and analyzed perceived social influence and perceived agency separately, because participants in Study 4 engaged in a lengthy social interaction with one another, allowing for the formation of separate impressions of each person's trait agency and his or her influence over the rest of the group in determining task outcomes. We expected that in Study 4 participants would judge each peer's social influence not merely on the basis of how agentic he or she seemed to be, but also based on how much actual influence he or she had over the group's decisions.

Social influence was measured in two ways. First, participants engaging in the interaction rated each other group member on three items: "This person led the task", "this person had high

status", and "this person was paid attention", on a scale ranging from 1 (*not at all*) to 7 (*very much*). Second, two research assistants blind to hypotheses and unacquainted with participants independently watched all video-recorded group interactions after the study was conducted (i.e., videos of full 20-minute interactions, not the 20-second video clips). After viewing each session, they judged each participant on his or her social influence by rating the extent to which each group member was "influential" (inter-rater alpha = .87), using a rating scale ranging from 1 (*Not at all*) to 5 (*Extremely*). By obtaining influence ratings from outside observers as well as interactants, we were able to assess perceived influence without potential biases resulting from having worked and become acquainted with targets.

5.2 Results

Bivariate correlations were conducted to assess relationships between nonverbal behaviors and rank strategies.[5] In support of our hypotheses, individuals who emerged as more prestigious (i.e., greater prestige target effects) engaged in more expansiveness, $r = .18$; $p = .01$, 95%CI: [.04 to .31], smiling, $r = .26$, $p < .001$, 95%CI: [.12 to .39], and upwards head tilting, $r = .19$, $p = .009$, 95% CI: [.05 to .32]. Downwards head tilt was not significantly correlated with prestige target effects at conventional levels, $r = -.11$, $p = .14$, 95% CI: [-.25 to .03]. Also consistent with our predictions, individuals who emerged as more dominant (i.e., greater dominance target effects) engaged in more expansiveness, $r = .18$, $p = .012$, 95%CI: [.04 to .31]. However, smiling, $r = -.07$, $p = .38$, 95% CI: [-.21 to .07], downwards head tilting, $r = -.12$, $p = .11$, 95%CI: [-.25 to .02], and upwards head tilt, $r = .03$, $p = .68$, 95%CI: [-.11 to .17], were not significantly correlated with dominance target effects (see also Table 3).

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[5] Confidence intervals were constructed around correlation coefficients with 100 bootstrapped samples based on Biesanz (*under review*).

Table 2. Correlations between Nonverbal Behaviors and Emergent Peer Perceptions.

	Prestige	Dominance	Agency	Communion	Liking	Influence (peer rated)	Influence (outside observer rated)
Expansiveness	0.18**	0.15*	0.24**	-0.12	0.15*	.22**	.31**
Head Tilt Up	0.19**	0.03	0.13†	0.07	0.15*	.11	.16*
Smiling	0.26**	-0.07	0.16*	.26**	0.29**	.14†	.14†
Head Tilt Down	-0.11	-0.12	-0.24	-.01	-0.15*	-.19**	-.18*
Prestige Display	0.26**	0.05	0.21**	.12†	0.23**	.18*	.23**

*Note. **p < .01, *p < .05, † < .10*

Based on our predictions for the prestige display, the results of Studies 1-3, and the correlations observed here among the predicted prestige display behaviors (See Table 2), we created a composite *prestige display* variable, by standardizing and averaging the behaviors of upwards head tilt, smiling, and expansiveness ($\alpha = .80$). Correlations among predicted dominance display behaviors were low or not statistically significant, so we did not create a similar dominance display composite (see Table 2). In support of our hypotheses, individuals who were more likely to engage in the composite prestige display were judged as higher in agency, $r = .22$, $p = .003$, 95% CI: [.08 to .35], more likeable, $r = .24$, $p = .001$, 95% CI: [.10 to .37], and marginally higher in communion, $r = .13$ $p = .077$, 95% CI: [-.01 to .27].

Table 3 Correlations Among Nonverbal Behaviors, Study 4

	1.	2.	3.	4.
1. Expansiveness	--			
2. Head Tilt Up	.83**	--		
3. Smiling	.43**	.43**	--	
4. Head Tilt Down	.20**	.18*	-.003	--

Note. **p < .01, *p < .05

Individuals who demonstrated the prestige display were also judged by their peers as more influential (i.e., social influence target effects), $r = .19$, $p = .01$, 95% CI: [.05 to .32], and were judged to be more influential by outside observers, $r = .23$, $p = .001$, 95% CI: [.09 to .36]. We next tested whether prestige displays predicted social influence target effects via perceptions of prestige, and not dominance, using the Preacher and Hayes (2008) indirect effect test, with the prestige display as the focal predictor, target effects of prestige and dominance as mediators, and target effects of social influence as the criterion (see Figure 7). Supporting our expectations, the prestige display predicted prestige target effects, $\beta = .30$, $t = 3.62$, $p < .001$, but not dominance target effects, $\beta = .06$, $t = .64$, $p = .52$, and prestige target effects in turn predicted social influence target effects, $\beta = .55$, $t = 15.04$, $p < .001$. Finally, as hypothesized, the indirect effect

of the prestige display on social influence was significant via prestige target effects, β = .17, 95% CI: [.06 to .28], but not via dominance target effects, β = .04, 95% CI: [-.09 to .15]. In fact, prestige target effects fully mediated this effect; including dominance and prestige target effects as mediators eliminated the direct effect of the prestige display on social influence, β = .02, p = .75. Including gender as a covariate did not alter any of these effects.

When outside-observer ratings of social influence were used as the outcome variable instead of peer ratings, the indirect effect of the prestige display on social influence was again significant via prestige target effects, β = .11, 95% CI: [.04 to .19], but not via dominance target effects, β = .03, 95% CI: [-.08 to .13]. As noted above, the prestige display predicted prestige target effects, β = .34, t = 3.68, p < .001, but not dominance target effects, β = .06, t = .62, p = .54, and prestige target effects predicted outside-observer rated social influence, β = .34, t = 6.06, p < .001. Including gender as a covariate did not alter any of these effects. However, when outside observer ratings of influence were the criterion, prestige target effects did not fully account for the indirect effect; the direct effect after controlling for both mediators, β = .16, p = .03.

5.2.1 Exploratory Analyses

We next sought to explore whether dominance and prestige strategists might convey their agency using different kinds of expansive behaviors. Bivariate correlations conducted between each separate expansive nonverbal behavior and each rank strategy indicated that prestigious individuals tended to display *chest expanded* and *torso pushed out*, r = .19, p = .008, 95% CI: [.05 to .32], and r = .19, p = .01, 95% CI: [.05 to .32], respectively, whereas dominant individuals showed no tendency toward displaying these forms of bodily expansion, r = .03, p = .67, 95% CI: [-.11 to .17], and r = .01, p = .95, 95% CI: [-.13 to .15], respectively (see Figure 8).

Conversely, dominant individuals tended to display *arms out*, $r = .28$, $p < .001$, 95% CI: [.14 to

.41], whereas prestigious individuals showed no such tendency, $r = .06$, $p = .44$, 95% CI: [.08 to

.20]. The bodily expansion item *body occupies much room* was also positively related to

dominance target effects, $r = .25$, $p < .001$, 95% CI: [.11 to .38], and only marginally to prestige

target effects, $r = .13$, $p = .055$, 95% CI: [-.01 to .27]; the same pattern emerged for *wide stance*, r

$= .18$, $p = .01$, 95% CI: [.04 to .31] for dominance, and $r = .14$, $p = .056$, 95% CI: [-.002 to .28]

for prestige. Interestingly, *arms raised* was not significantly related to prestige, $r = .07$, $p = .32$,

95% CI: [-.07 to .21], nor dominance, $r = .12$, $p = .11$, 95% CI: [-.02 to .26].

Figure 7. Effect of Prestige Display on Social Influence, Mediated by Perceptions of Prestige
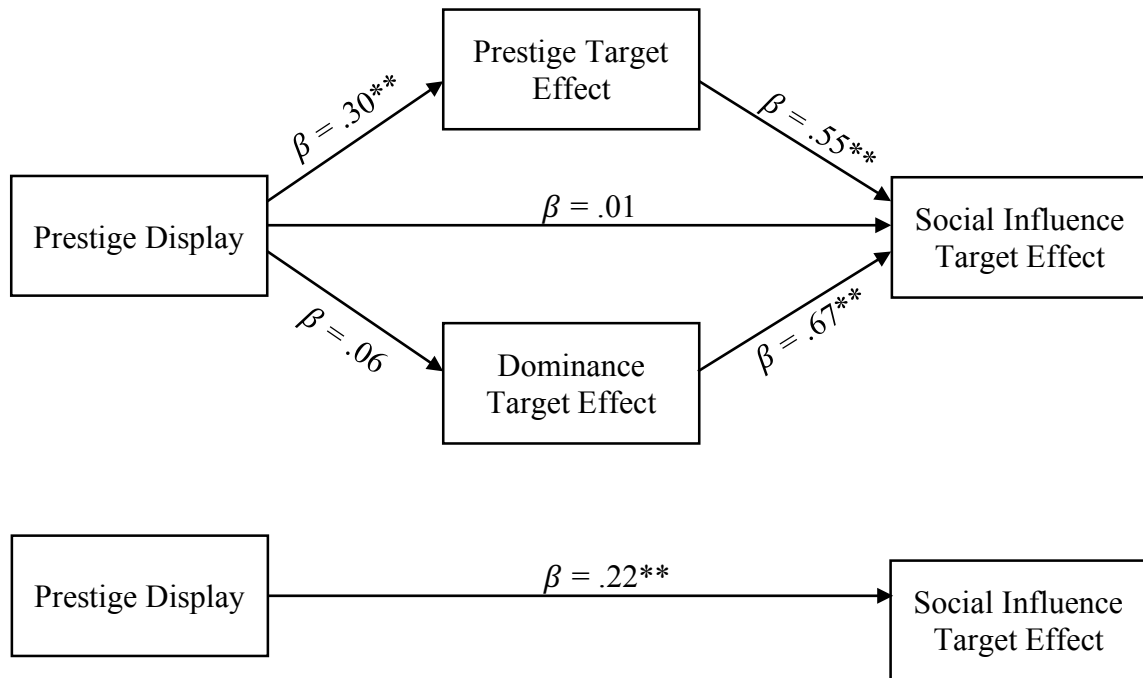

**p < .01. Target effects were derived using Social Relations Model (Kenny & La Voie, 1984).

Together, these results provide preliminary evidence to suggest that the ways in which

individuals expand their bodies—that is, the specific behaviors used—may vary by dominance

and prestige strategies. More specifically, subtle expansive behaviors closely linked to the

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nonverbal expression of pride, such as chest expanded and torso pushed out, appear to be more

indicative of prestige than dominance, whereas more overt expansive behaviors such as

spreading one's arms out from the body, holding a wide stance, and occupying more space,

appear to be more closely associated with dominance than prestige. Therefore, aggregating these

behaviors into a single "expansiveness" item amalgamates two distinct types of expansiveness,

and many of the specific effects are stronger than the generalized expansiveness effect. We more

directly test these specific expansive behavioral distinctions in Study 5.

Figure 8. Correlations Between Each Expansive Behavior and Rank Strategy, Study 4.
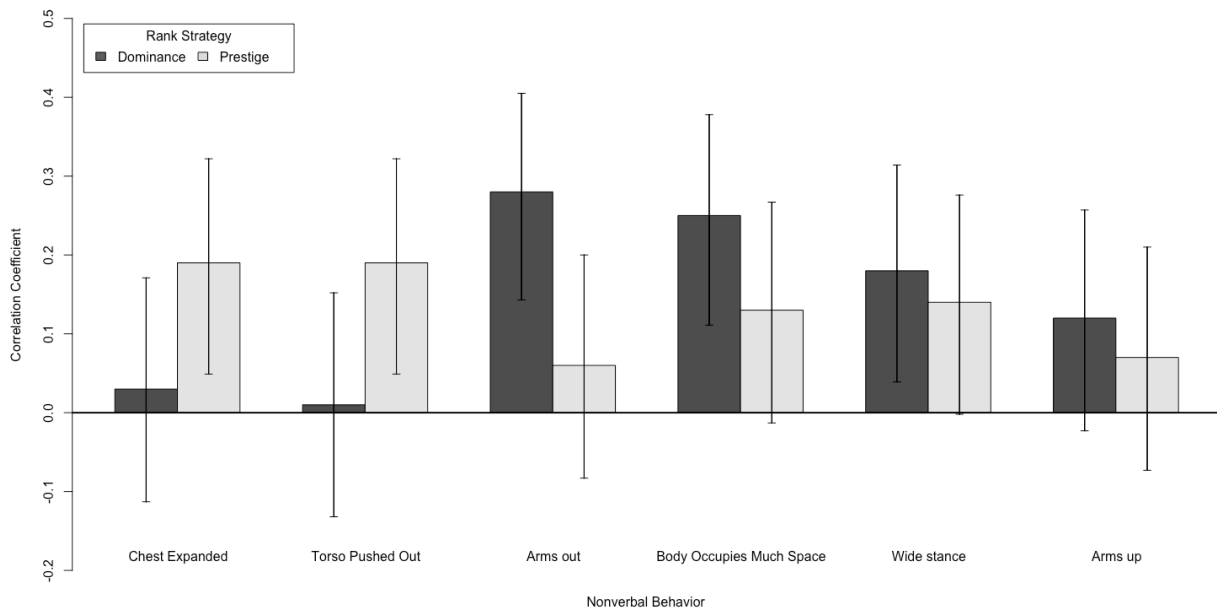
Note. Error bars indicate 95% CI around each correlation.

5.3 Discussion

Study 4 demonstrated that individuals whose peers judged them as prestigious tended to

spontaneously display the nonverbal expression of prestige (i.e., expansive bodily displays,

smile, upwards head tilt) in an ecologically valid rank contest. Furthermore, showing these

displays predicted emergent rank outcomes; individuals who displayed greater prestige were

judged to have greater influence over their group, both by their fellow group members and by unacquainted outside observers. Finally, these associations were mediated by perceptions of prestige and not dominance, suggesting that individuals who engage in prestige behaviors are perceived as prestigious at least in part as a result of these behaviors, and these perceptions drive consequent social influence. These results provide strong support for the suggestion that the nonverbal expression of prestige uncovered in Studies 1, 2, and 3 is naturally displayed in ecologically valid group settings, and functions to influence impressions that lead to social influence.

In contrast, the results for dominance displays were less consistent. Although dominant individuals tended to display expansiveness, no significant relation emerged between dominance perceptions and smiling or head tilt, suggesting that in this particular social interaction, peers were not reliably using these nonverbal behaviors to infer dominance, or dominant individuals were not systematically engaging in these two components of the display. Importantly, though, dominant individuals did not show any evidence of displaying behaviors distinct to prestige, yet dominants still influenced group behavior.

One possible explanation for the absence of an observed significant relationship between (reduced) smiling and dominance is that with the coding process we used reduced smiling was challenging to measure, as neutral facial displays are also absent of a smile (Coan & Gottman, 2007). In other words, the absence of a positive correlation between dominance target effects and smiling may indicate that dominants tended to display a non-smiling neutral expression, or at least that they were as likely to do so as they were to smile, in contrast to prestige strategists who were more inclined to smile. Analyzing full 20-minute interactions, rather than sampling only

key time-points, could help improve accuracy of our assessment of smiling frequency and intensity.

The absence of a significant relation between head tilt downward and dominance may be a result of the known positive association between head tilt down and submissiveness, a trait that is associated with low levels of both dominance and prestige. Submissiveness, or shame, is conveyed from a head tilt downward with eye gaze directed downward rather than straight ahead (Tracy, Robins, & Schriber, 2009); in contrast, based on Studies 1-3 as well as evidence from other research (Hehman et al., 2013; Mignault & Chaudhuri, 2003; Rule et al., 2012; Witkower & Tracy, in prep), dominance is associated with head tilt downward only when eye gaze is directed. In the present Study 4, because only two video cameras were used to record up to six participants at a time, it was not possible to accurately and reliably code eye gaze direction, making it similarly difficult to interpret the null relation between head tilt downward and dominance. We sought to address this limitation in Study 5.

Finally, Study 4 provides the first preliminary evidence that different forms of bodily expansive behaviors are displayed by dominant and prestigious individuals. Prestigious individuals tended to show subtle forms of expansiveness (i.e., chest expansion, torso pushed out), whereas dominants tended to display more overt and extreme space-taking behaviors (e.g., arms out, arms up). This distinction is consistent with prior research suggesting that subtle shifts in posture are related to perceptions of competence, intelligence, and popularity (Back, Schmukle, & Egloff, 2010; Weisfeld & Beresford, 1982), whereas larger expansive behaviors are related to perceptions of anger, threat, and social rank (Cashdan, 1998; Hall et al., 2005; Marsh et al., 2009); these latter behaviors may increase perceived physical prowess and also appear invasive of others' personal space (Marsh et al., 2009; Vieira & Marsh, 2014).

6 Study Five

Study 4 provided the first evidence that prestige and dominance behaviors are displayed by individuals who emerge as prestigious and dominant during an ecologically valid group setting. In Study 5 we sought to determine whether these same displays are spontaneously shown by prestigious and dominant individuals as they attempt to influence observers in a real-world context, outside the laboratory. More specifically, we analyzed the nonverbal behaviors shown by former Senator Hillary Clinton and President Donald Trump during the three televised 2016 U.S. Presidential debates.

There is good reason to suspect that former Senator Clinton and President Trump exemplify prestige and dominance strategists, respectively. First, former Senator Clinton won the popular vote and President Trump won the electoral college, indicating that both candidates were successful in influencing a large proportion of voter behavior. However, the two candidates used very different strategies to do so. First, a recent study had participants judge the dominance and prestige of President Trump and former Senator Clinton, using a shortened version of the Dominance and Prestige scales (Cheng et al., 2013; Kakkar & Sivanathan, 2017). They found that President Trump is viewed as more dominant than former Senator Clinton, whereas former Senator Clinton is viewed as more prestigious than President Trump (Kakkar & Sivanathan, 2017).

Consistent with these results, Musser and Orke (1992) have characterized Trump as an independent maximizer; an individual who goes about "seeking their own interests in a way that is insensitive to the needs of others" (see Eaton & Giacomino, 2000; p. 219). This characterization maps perfectly onto one of the items used to measure dominance in Studies 1-4 (i.e., "This person often tries to get their own way regardless of what others may want"), and is

prototypical of dominant strategists (Cheng et al., 2013; Maner & Mead, 2010). Furthermore, a quantitative discourse analysis by Calhoun (2016) found that Trump showed a greater difference in the use of self-centered compared to group-centered pronouns than other presidential candidates during the primary debates (see also Ahmadian, Azarshahi, & Paulhus, 2017), and was more likely to engage in metaphors centered around aggression, fighting (i.e., boxing), and conflict. These tendencies are also consistent with the use of a dominance strategy (Maner & Case, 2016; Maner & Mead, 2010; Henrich & Gil-White, 2001). Trump also demonstrates high levels of grandiosity (Ahmadian et al., 2017), which has been linked to hubristic pride and dominance (Cheng et al., 2010; Tracy et al., 2010). Finally, several scholars have noted that during both the primary and regular election campaign Trump regularly attempted to intimidate his critics and opponents with threats in order to attain power, thus demonstrating behaviors that are definitional of dominance (McAdams, in press; Tracy, 2016a; 2016b).

Conversely, former Senator Clinton is so strongly associated with concepts of success and expertise – central to prestige – that her image has been used by experimental psychologists to effectively prime concepts of successful women in leadership (Latu, Mast, Lammers, & Bombari, 2013). Furthermore, men and women judge Clinton to be equally competent as some of the most competent world leaders, such as Bill Clinton and Angela Merkel (Latu, Mast, Lammers, & Bombari, 2013). Clinton has also been identified as a desirable person to have as a teammate during a difficult situation and as someone who would reduce one's worries about poor performance on a difficult task, suggesting that individuals tend to believe they would enjoy working with her and hold an approach orientation toward her, as is essential for prestigious leaders to retain their power (Taylor, Lord, McIntyre, & Paulson, 2011). Finally, as a former Secretary of State and U.S. former Senator, Clinton has held several of the highest ranking

political positions in U.S. politics, which have provided her with actual knowledge and experience in dealing with some of the most important world political affairs (although Trump now holds such a position, prior to the 2016 Debates he had not).

In sum, although it is likely that both Trump and Clinton have at times used both dominance and prestige to get ahead, the preponderance of evidence suggests that during the 2016 Debates, Trump was a more typical dominance strategist and Clinton a more typical prestige strategist. Nonetheless, we directly tested this assumption in Study 5 by coding segments of speech made by each candidate across the three televised presidential debates and assessing the extent to which these segments conveyed attacks or demonstrations of aggression (indicative of dominance) and demonstrations of expertise (indicative of prestige). We expected to observe greater demonstrations of expertise or knowledge and fewer attacks from Clinton, and the reverse behavioral pattern from Trump.

Turning to our main hypotheses for Study 5, we predicted that across the three presidential debates Clinton, as a prestige strategist, would show greater evidence of nonverbal displays of prestige, including upwards head tilting and smiling, compared to Trump. Conversely, we predicted that Trump, as a dominance strategist, would show greater evidence of nonverbal displays of dominance, including downwards head tilting (with eye gaze directed toward Clinton) and less smiling, compared to Clinton. Although we expected both candidates, as highly agentic and influential individuals, to demonstrate expansive behaviors, based on the preliminary results of Study 4 pointing to potentially distinct forms of expansiveness, we further expected Clinton to engage in more subtle forms of expansiveness (i.e., chest expansion), and Trump to engage in more overt and space-taking forms of expansiveness (e.g., arms out, body occupying much room). Finally, expansive behaviors not distinctly related to prestige or

dominance in Study 4 (i.e., arms up) were not expected to be displayed to a significantly greater extent by either candidate.

6.1 Materials and Procedure

To test the validity of our assumption that Clinton and Trump are prestige and dominance strategists respectively, two research assistants blind to hypotheses listened to all three presidential debates (audio only) and identified specific time-points in which one candidate or the other engaged in either an attack (defined as a behavior intended to harm the other candidate; Anderson & Bushman, 2002), or demonstrated his or her knowledge and expertise (i.e., by identifying specific experiences, capabilities, or a fundamental understanding of a topic). Both coders were undergraduate students at a Canadian University, currently living in Canada, and not eligible to vote in the U.S. election. Final time-points were selected for subsequent analyses based on total consensus among coders; this resulted in the inclusion of 108 non-overlapping 5-second time-points across the three debates.

Next, to code the nonverbal behaviors displayed by each candidate, a new team of three research assistants independently watched 5-seconds of video starting at each identified time-point.[6] These individuals were blind to hypotheses and why those particular time points had been chosen, or what was happening at that moment in the debates. They viewed the video clips without sound. All three were students or recent graduates of a Canadian University, currently living in Canada, and not eligible to vote in the U.S. election. Research assistants were instructed to code the intensity of each of the behaviors found in Study 4 to be associated with prestige or dominance using a rating scale ranging from 0 (behavior not at all present) to 3 (most intense

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[6] Although three coders were used to code all nonverbal behaviors, the coding performed by one of these individuals were excluded for the items *chest expanded* and *body occupies much room* to improve inter-rater reliability.

version of the behavior present), based on past research (Tracy & Matsumoto, 2008): *head tilt up* (α= .72), *smiling* (α= .87), *chest expanded* (α= .59), *arms up* (α= .91), *arms out* (α= .83), and *body occupies much room* (α= .61). Coders were not provided with any information about the meaning of these behaviors. Although two additional behaviors –*wide stance* and *torso pushed out* –were examined in Study 4, these behaviors were not analyzed in the current study because they were not regularly observable (i.e., they were often out of the vantage of the camera). To address a limitation of Study 4, coders were additionally told to determine whether each candidate engaged in the combination of a downwards head tilt with eye gaze directed towards the other candidate, or not (α= .62). Stated differently, coders analyzed each 5-second clip and identified whether the candidate engaged in a downwards head tilt with eye gaze directed, or did not engage in this combination of behaviors.

6.2 Results

6.2.1 Did Clinton and Trump Differ in their use of Prestige versus Dominance Strategies?

A Chi squared test of independence on the number of attacks and demonstrations of expertise displayed by each candidate revealed a significant difference between the two candidates in the use of each strategy, $X^2 = 13.46$, $p < .001$. Specifically, Trump engaged in more attacks than Clinton, 53 vs. 26, $p < .05$, and Clinton engaged in more demonstrations of knowledge and expertise than Trump, 21 vs. 8, $p < .05$ (see Figure 9). Further supporting this result, a secondary spearman correlation indicated a significant relationship between candidate and strategy, such that Trump engaged in more attacking, whereas Clinton engaged in more expertise demonstration, $r = .35$, $p < .001$. These results support our expectation that Clinton and Trump

are prestige and dominance strategists, respectively, and engaged in behaviors correspondent to each rank-attainment tendency during the three presidential debates.

Figure 9. Proportion of Attacks (indicating Dominance) and Demonstrations of Expertise (indicating Prestige) by Each Candidate, Across the three Presidential Debates, Study 5
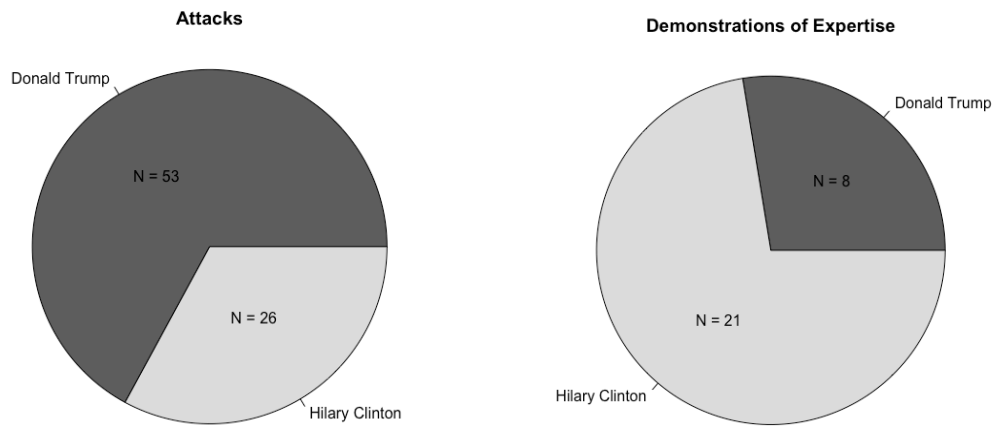
6.2.2 Did Clinton and Trump Differ in their use of Prestige versus Dominance Strategies?

We conducted separate univariate ANOVAs to test whether each coded behavior was displayed to a different extent by each candidate. In support of our hypotheses, significant effects emerged for head tilted upward, $F(1,106) = 45.27$, $p < .001$, $d = 1.28$; smiling, $F(1,106) = 34.42$, $p < .001$, $d = 1.06$; and, marginally, head tilted downward with gaze directed, $F(1,106) = 3.20$, $p < .077$, $d = .35$; indicating that Clinton engaged in greater upwards head tilting and smiling than Trump, whereas Trump engaged in marginally more downwards head tilting with gaze directed than Clinton (see Figure 10).

6.2.3 Nonverbal Expansiveness

We next sought to test the hypothesis emerging from Study 4, that dominance and prestige strategists use different forms of bodily expansion. We conducted separate univariate ANOVAs

predicting each of the four expansiveness behaviors coded. Replicating the results of Study 4,

Clinton engaged in greater chest expansion than Trump, $F(1,106) = 11.85$, $p \leq .001$, $d = .67$, but

Trump occupied more space and extended his arms out from his body more than Clinton,

$F(1,106) = 11.36$, $p \leq .001$, $d = .66$, and $F(1,105) = 11.15$, $p \leq .001$, $d = .66$ (see Figure 10). Also

consistent Study 4, the two candidates did not differ in the extent to which they raised their arms

upward, $F(1,106) = 1.84$, $p = .18$, $d = .27$, though there was a trend toward greater arm raising by

Trump, as was observed in Study 4 for dominant participants.

Figure 10. Nonverbal Behaviors Displayed by Each Candidate Across the Three Presidential Debates.
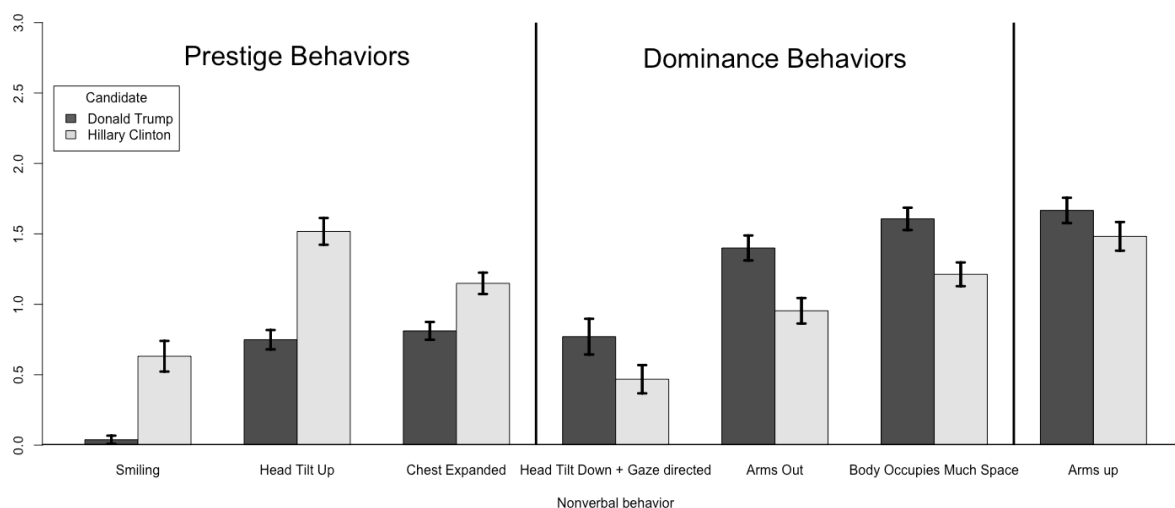
Note. Error bars indicate +/- 1SE.

6.3 Discussion

In Study 5 we found that former Senator Clinton and President Trump—a prestigious and a

dominant leader, respectively, demonstrated the nonverbal behavioral displays associated with

their corresponding rank-attainment strategies during the three U.S. Presidential debates. These

results provide the first evidence that the nonverbal expressions of prestige and dominance first

uncovered in Studies 1, 2, 3, and 4, are spontaneously displayed by prestige and dominance strategists in real world rank contests.

Several of the more specific results from this study are particularly noteworthy. First, consistent with our predictions, a downwards head tilt combined with gaze directed toward the other candidate was marginally more likely to be displayed by the dominant candidate. In contrast to the video clips coded in Study 4, in Study 5 we were able to obtain high-definition, close-up recordings of the candidates from a range of angles, allowing our coders to identify specific instances in which each candidate displayed a downwards head tilt with or without gaze directed. Second, replicating the exploratory findings of Study 4, subtle forms of expansive bodily movements (i.e., chest expanded) were displayed to a greater extent by the prestige strategist, while more overt and space-taking forms (i.e. body occupying much space, arms extended outward) were displayed to a greater extent by the dominant strategist. Arms raised above the head– an expansive behavior that was not significantly related to dominance or prestige in Study 4 – was here shown to a similar extent by both candidates, as well. Together, Studies 4 and 5 thus provide the first evidence that although dominance and prestige are both signaled by expansive bodily movements (as was found in Studies 1-3), the two signals differ in the specific forms this expansiveness takes.

One important limitation of Study 5, however, is that the presumed differences between the candidates in dominance and prestige are completely confounded with gender. It is therefore possible that the behavioral differences observed between the two targets were a result not of their particular rank strategy but rather of sex differences in nonverbal behavioral displays. Prior studies have shown that women tend to smile more than men (LaFrance, Hecht, & Paluck, 2003), and men tend to engage in more grandiose forms of expansiveness than women (Gallaher, 1992).

However, the convergence in results across the five studies reported here somewhat ameliorates this concern, as does the evidence from Study 3 that the same behaviors led to similar judgments across male and female targets, and the evidence from Study 4 that the same behavioral patterns occurred among both men and women. Furthermore, the effect sizes observed in Study 5 far exceed the average sizes of relevant sex differences documented in past research (e.g., the difference in smiling between Clinton and Trump was $d = 1.06$, whereas the meta-analytic effect size for sex differences in smile frequency is $d = .41$; LaFrance et al., 2003). Nonetheless, future studies are needed to examine the extent to which these distinct displays are used to communicate dominance and prestige by both men and women in real-world contexts.

7 General Discussion

The present research was the first to examine whether there are distinct sets of nonverbal behaviors that are displayed by prestigious and dominant individuals, and whether these same behaviors are utilized by observers to form perceptions of prestige and dominance, and to confer social rank upon displayers on this basis. Based on prior research, we hypothesized that expansiveness, smiling, and an upwards head tilt would be associated with prestige, whereas expansiveness, no smile, and a downwards head tilt would be associated with dominance. Using a multi-method approach that included tightly controlled experimental manipulations, a correlational study examining actual group interactions and the impact of nonverbal displays on emergent rank outcomes, and an observational study based on real-world data from validated prestige and dominance strategists during the U.S. presidential debates, we found strong support for both of these hypotheses, as well as for a more exploratory hypothesis regarding the distinctive forms of expansive bodily displays shown by dominance and prestige strategists.

More specifically, in Studies 1, 2, and 3 we found that perceivers made impressions of targets' dominance and prestige on the basis of the predicted sets of behaviors, and did not tend to confuse the two displays. In other words, judges perceived dominance rather than prestige from the permutation of expansiveness, no smile, and head tilt down, and prestige rather than dominance from the permutation of expansiveness, smiling, and head tilt up. Furthermore, the prestige display was positively, and the dominance display negatively, associated with liking and communion, but both displays were positively associated with perceptions of agency and social influence. These results held across male and female judges and targets, suggesting these two displays carry the same signal value across gender.

In Study 4 we found individuals working together on a group task tended to spontaneously display the behaviors found to be associated with dominance and prestige, and group members' perceptions of each other's relative dominance and prestige were at least partly based on these displays. Furthermore, prestige nonverbal behaviors predicted the amount of influence individuals attained over their groups, based on ratings made by both fellow group members and unacquainted outside observers. This effect was fully mediated by these individuals' peers' perceptions of their prestige, suggesting that because nonverbal displays of prestige led to perceptions of prestige, these displays consequently increased these individuals' attainment of social influence.

In Study 4 we also uncovered evidence to suggest that there are subtle differences in the kinds of expansive behaviors displayed by prestigious and dominant individuals, with the former showing subtle postural movements typically associated with the nonverbal expression of pride (i.e., chest expansion) and the latter showing larger and more obvious space-consuming movements (e.g., wide stance, arm extension). Finally, in Study 5, by examining former Senator Clinton and President Trump's nonverbal behaviors in the 2016 presidential debates, we found that the predicted set of prestige and dominance behaviors were each displayed in a real-world rank context, by a prestige and dominance strategist. Study 5 also replicated the finding from Study 4 that the two strategies are associated with distinctive forms of expansiveness. Together, these five studies thus provide strong converging evidence that dominance and prestige are associated with distinct nonverbal signals which naturally emerge in ecologically valid group settings and real world rank contests, and result in rank conferral from others.

7.1 Theoretical Implications

Although a large body of research has demonstrated that certain nonverbal behaviors are associated with generalized high rank, the present studies are the first to find distinct nonverbal behavioral suites associated with two distinct forms of high rank – prestige and dominance. These findings are consistent with the notion that humans have evolved two distinctive forms of social rank, which are characterized by distinct vocal signals, psychological frameworks, and evolutionary functions, yet which both lead to status conferral from others (Cheng et al., 2013; Cheng et al., 2010; Cheng et al., 2016; Henrich & Gil-White, 2001; Maner & Case, 2016; Tracy et al., 2010). Furthermore, our finding that both men and women received conferrals of status as a result of displaying nonverbal expressions of prestige and dominance is consistent with research suggesting that prestige and dominance are viable avenues for rank attainment among both genders (Cheng et al., 2013; Maner & Case, 2016).

One benefit of the present results is that they help explain several inconsistencies that have emerged in past research. First, past research examining the impact of head tilt on rank perceptions have produced a variety of findings, at times showing that downwards head tilt increases perceptions of high rank, and at other times that an upwards head tilt head tilt increases perceptions of high rank, (Bente et al., 2010; Hehman et al., 2013; Mignault & Chaudhuri, 2003; Rule et al., 2012; for review see Witkower & Tracy, in prep). Similarly, smiling has been associated with perceptions of both high rank and low rank (Hall et al., 2005; Shariff et al., 2012; Shariff & Tracy, 2009; Tracy et al., 2013), and a meta-analysis has shown a large amount of heterogeneity among these effects (Hall et al., 2005). The present results suggest that these mixed findings are likely to be due to the ways in which rank has been measured in the relevant past studies; typically, these studies did not distinguish between dominance and prestige, yet

measured rank using words likely to connote one form of rank or the other, fairly interchangeably (Cheng et al., 2013).

Another noteworthy finding emerging from the present research is the large overlap between the prototypical pride expression and the observed prestige display (i.e., chest expanded, smile, head tilted upward). These results may explain why the pride expression is associated with high rank across societies (Shariff et al., 2012; Shariff & Tracy, 2009; Tracy & Robins, 2007; Tracy et al., 2013; Tracy & Matsumoto, 2008); in displaying pride, individuals are also signaling their prestige. However, this conclusion raises questions for prior accounts that distinguished between two forms of pride: authentic and hubristic (Tracy & Robins, 2007). Although authentic pride is strongly related to prestige, and may be the emotion that most drives prestige attainment (Cheng et al., 2010; Tracy, 2016), hubristic pride is just as strongly related to dominance, and has been found to be either negatively or not related to prestige (Cheng et al., 2010). The pride expression communicates both forms of pride (Tracy & Robins, 2007b), but the present findings indicate that hubristic pride might in fact be better identified from an expression that includes elements of the dominance display –such as head tilt downward (rather than upward), wider stance, and perhaps even reduced smiling. Exploring these questions is an important direction for future research.

These findings also have implications for our understanding of prestige and dominance as two distinct forms of high rank. The finding that these strategies are associated with different signals bolsters accounts suggesting that prestigious and dominant individuals are likely to seek disparate forms of followership, and that followers are likely to behave differently when interacting with prestigious and dominant leaders (Cheng et al., 2013, 2016; Henrich & Gil-White, 2001). Although past research has identified vocal characteristics that can be used to

identify dominance, the current study provides the first evidence that nonverbal behaviors also play a role in the distinctive signaling process (Cheng et al., 2016). Future studies might further probe the social functions of separately signaling dominance and prestige by examining the divergent ways in which observers respond to these nonverbal displays.

The current research also has implications for research on nonverbal displays of high rank. Prior studies have shown that expansiveness functions to increase the apparent size of a displayer (Marsh et al., 2009), and although this is likely to be the case for the space-consuming form of expansiveness we found to be associated with dominance (e.g., arms out, body occupy much room), the more subtle chest expansiveness we found among prestigious individuals might have a different function. As another example, the present findings have implications for the literature on "power posing", which typically manipulates "expansiveness" without clearly delineating how, or which behaviors are critical to the display (for review, see Carney, Cuddy, & Yap, 2015). Given the present evidence suggesting that different forms of expansiveness send very different messages about power, the previously documented power pose may well be associated with two largely opposing messages. If this is the case, it could help account for inconsistencies observed in the relationship between power posing and behavioral outcomes (Carney et al., 2015; Ranehill et al., 2015; but see Simmons & Simonsohn, 2017). Regardless of what the future holds for power posing research, researchers who seek to test this account should more rigorously consider the physiological makeup of the behaviors involved in the pose.

It is important to note several limitations of the present research. First, we used a top-down, theoretically driven approach, in which we measured or manipulated specific behaviors we expected to be linked to each rank strategy based on prior research on agency and communion. It is therefore possible that additional behaviors distinct to dominance and prestige

exist, but were not examined here. An important future direction is therefore to use a more bottom-up approach to explore whether dominance and prestige strategists might use additional nonverbal behaviors to communicate their rank.

Second, although our findings are largely convergent evidence across five studies, several minor inconsistencies did emerge. For example, in Study 4, downwards head tilt was not related to dominance—likely due to our inability to code eye gaze direction in that study, as well as our use of only one camera recording up to three people, which prevented us from adjusting camera angles for individual participants or centering participants within the frame. Some of these limitations are addressed in Study 5, but future studies should verify these results in additional naturalistic group interactions using cameras tailored to each individual. In addition, given the importance of eye gaze direction when considering head tilt (Witkower & Tracy, in prep), future studies should consider using automated coding software to more accurately assess eye and head movements as they emerge in the real world (Cohn, Reed, Ambadar, Xiao, Moriyama, 2004; Velloso, Bulling, & Gellersen, 2013; Xiao, Moriyama, Kanade, & Cohn, 2003).

Finally, like much psychological research, all of the present studies were based on samples drawn from North American (i.e., largely WEIRD) populations (Henrich, Heine, & Norenzayan, 2010). If the displays observed here are part of the evolved suites of behavior associated with dominance and prestige, then they should reliably signal each rank strategy across diverse populations. An important direction for future research is therefore to test the extent to which these displays generalize across populations. Although an upwards head tilt and expansive posture have been associated with perceptions of high rank across populations (Bente et al., 2010; Tracy et al., 2013), studies have yet to test whether distinct expressions of dominance and prestige are recognized as distinct forms of high rank across populations.

In conclusion, the current research provides the first evidence that prestige and dominance are associated with distinctive nonverbal signals, which facilitate rank attainment. Prestige is associated with subtle forms of expansiveness (chest expanded, torso pushed out), a smile, and an upwards head tilt, whereas dominance is associated with larger space-consuming forms of expansiveness (e.g., arms out from body, wide stance), reduced smiling, and a downwards head tilt. Our findings are consistent with the suggestion that humans use distinct sets of nonverbal behaviors to communicate their prestige and dominance, and observers rely on these distinct behaviors, alongside vocal, emotional, and personality characteristics, to identify and confer status to prestigious and dominant individuals.

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Appendices
Appendix A: Attention Check Question

Question:
Research in decision making shows that people, when making decisions and answering questions, prefer not to pay attention and minimize their effort as much as possible. Some studies show that over 50% of people don't carefully read questions. If you are reading this question and have read all the other questions, please select the box marked 'other' and type 'Decision Making' in the box below. Do not select "predictions of your own behavior." Thank you for participating and taking the time to read through the questions carefully!

What was this study about?

Answer Choices:
1) Predictions of your own behavior
2) Predictions of your friends' behavior
3) Political preferences
4) Other (Please specify) _____

Criteria:
Respondents who select option choice 4 ("Other") and indicated "Decision Making" (not case sensitive) were included in final analyses.

Appendix B: Supplementary Materials, Study 1

Perceptions of Dominance

As reported in the main text, we conducted a 2 (expansiveness) X 2 (smiling) X 3 (head tilt) repeated-measures analysis of variance (ANOVA) on perceptions of dominance. In addition to the main effects reported there, we observed a head tilt by expansiveness interaction, $F(2, 240) = 7.56$, $p = .001$, $\eta_p^2 = .06$, as well as a head tilt by smiling interaction, $F(2, 240) = 8.82$, $p < .001$, $\eta_p^2 = .07$ (see Figures S1 and S2).

The head tilt by expansiveness interaction indicated that although a downwards head tilt always increased perceptions of dominance when compared to a neutral and upwards head angle ($ps < .05$), for expansive targets (when compared to neutral-posture targets) the magnitude of this effect was smaller. In addition, an upwards head tilt decreased perceptions of dominance compared to a neutral head angle when paired with expansive posture, but not when paired with a neutral posture (See, and Figure S1). The head tilt by smiling two-way interaction indicated a similar pattern: a downwards head tilt always increased perceptions of dominance when compared to a neutral and upwards head angle ($ps < .05$), but for non-smiling targets the magnitude of this effect was smaller (See Figure S2). These two-way interactions likely emerged as a result of a ceiling effects; the absence of a smile and expansive posture increased perceptions of dominance, reducing the potential impact of a downwards head tilt on such perceptions.
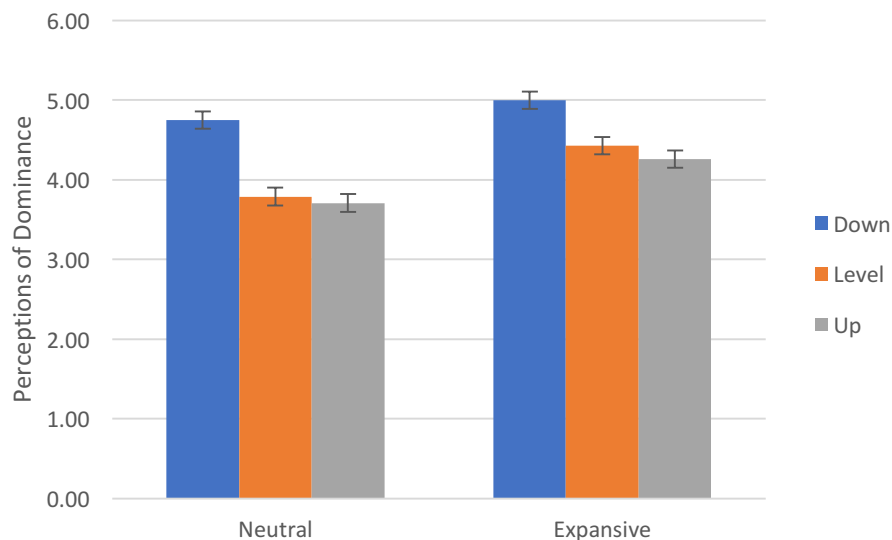

Figure S1. Head Tilt by Expansiveness Interaction Predicting Dominance, Study 1. Error bars indicate +/- 1SE.
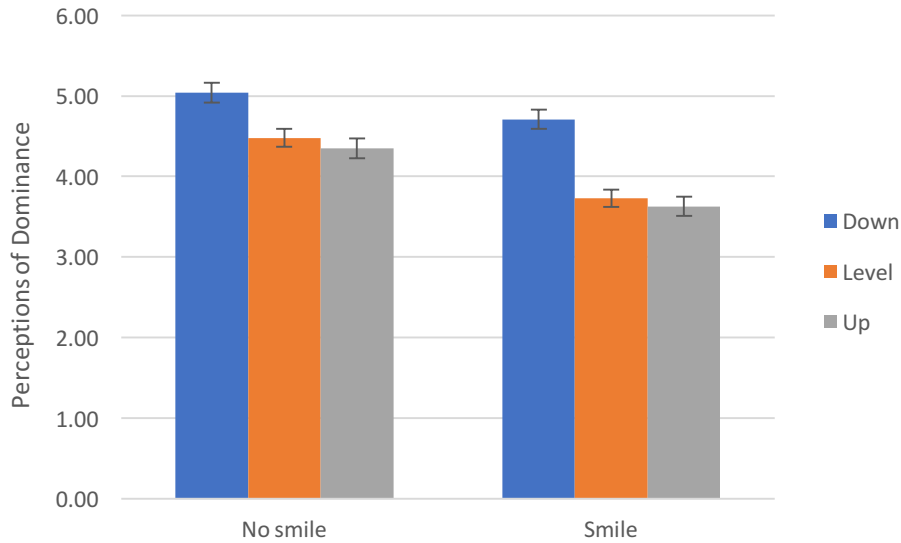
Figure S2. Head Tilt by Smiling Interaction Predicting Dominance, Study 1. Error bars indicate +/- 1SE.

Perceptions of Liking

As reported in the main text, we conducted a 2 (expansiveness) X 2 (smiling) X 3 (head tilt) repeated-measures ANOVA on perceptions of liking. In addition to the reported main effects, we observed 2-way interactions between head tilt and smiling, $F(2,240) = 6.06$, $p = .003$, $\eta_p^2 =.04$, and head tilt and expansiveness, $F(2,240) = 3.71$, $p = .03$, $\eta_p^2 =.03$. However, these were qualified by a 3-way interaction between head tilt, smiling, and expansiveness, $F(2,240) = 5.38$, $p = .005$, $\eta_p^2 =.04$ (See Figure S3).

This 3-way interaction indicated that a downwards head tilt always had a significant negative effect on liking when compared to a neutral and upwards head tilt, regardless of whether the target was expansive or smiling (ps < .05). In addition, an upwards head tilt had no effect on liking if a smile was present, regardless of whether the target was also expansive (ps > .05). However, when targets were not smiling, an upwards head tilt increased perceptions of liking only when targets were expansive ($p < .05$); when targets were neither smiling nor expansive, perceptions of liking decreased ($p < .05$). This interaction parallels the 3-way interaction uncovered for perceptions of prestige in Study 1; an upwards head tilt decreases perceptions of liking if shown in isolation, but when paired with other behaviors associated with prestige (i.e., expansiveness or smiling), upwards head tilt is equally or more effective in increasing liking.
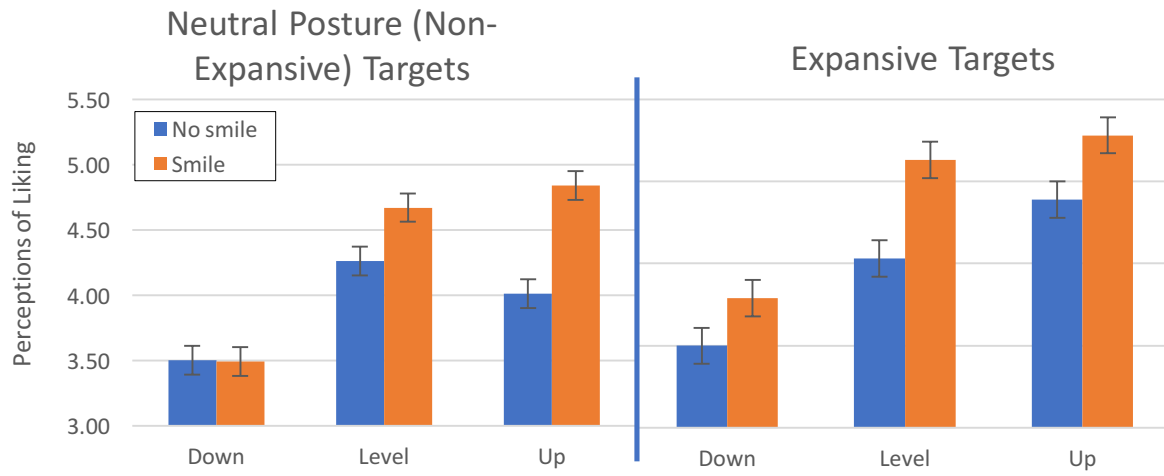
Figure S3. Three-way Interaction Between Expansiveness, Smiling, and Head Tilt. Error bars indicate +/- 1SE.

Appendix C: Supplementary Materials, Study 3

Perceptions of Dominance

As reported in the main text, we conducted a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance (ANOVA) on perceptions of dominance. A 2-way interaction between sex and display emerged, $F(3,654) = 11.21$, $p < .001$, $\eta_p^2 = .05$ (See Figure 6 in main text, and Table S1). Importantly, the dominance display was perceived as significantly more dominant than all other nonverbal displays, regardless of displayer and participant sex (all ps < .001). For males, the prestige and neutral displays did not differ significantly in dominance ($p = .31$), but for females the prestige display was judged significantly more dominant than the neutral display ($p < .001$). Additionally, for males the prestige display was not judged as significantly more dominant than the happy display ($p = .77$), but for females the prestige display was judged significantly more dominant than the happy display ($p < .001$). This gender difference might be indicative of a systematic bias to perceive agentic females (but not agentic males) as colder and therefore more dominant (Fiske, Cuddy, Glick, & Xu, 2002).

Table S1. Mean Dominance Perceptions of each Display, Separately by Gender

	Males	**Females**
Display Type	Mean (SE)	Mean (SE)
Neutral	4.43[b] (.12)	3.31[c] (.12)
Dominance	**5.44[a] (.13)**	**5.09[a] (.13)**
Happy	3.97[c] (.13)	2.93[c] (.13)
Prestige	4.13[bc] (.12)	4.08[b] (.12)

Note. Superscripts indicate significant differences based on 95% CI created around mean. SE = Standard Error.

Perceptions of Agency

As reported in the main text, we conducted a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance (ANOVA) on perceptions of agency. In addition to the main effects reported in text, we observed a 2-way interaction between sex and display, $F(3,654) = 8.19$, $p < .001$, $\eta_p^2 = .04$ (see Figure S4). This interaction indicated that while the prestige display was perceived as significantly more agentic than both the happy and neutral display for both males and females (ps $\leq$ .001, ds $\geq$ .38), the dominance display was perceived as significantly more agentic than the happy display for females only ($p = .002$, $d = .43$); among men, the dominance display was judged to be no more agentic than the happy display, $p > .99$, $d = -.16$. The male dominance display was, however, judged more agentic than neutral (for both females and males ps < .001, ds $\geq$ .66), suggesting that the dominance display increased perceptions of agency compared to a neutral target, but the happy display also increased perceptions of agency for males. As discussed in the main text, the male happy display was perceived as unusually dominant, a result somewhat inconsistent with prior research suggesting that smiling robustly decreases perceptions of high rank (Hall, Coates, Lebeau, 2005).
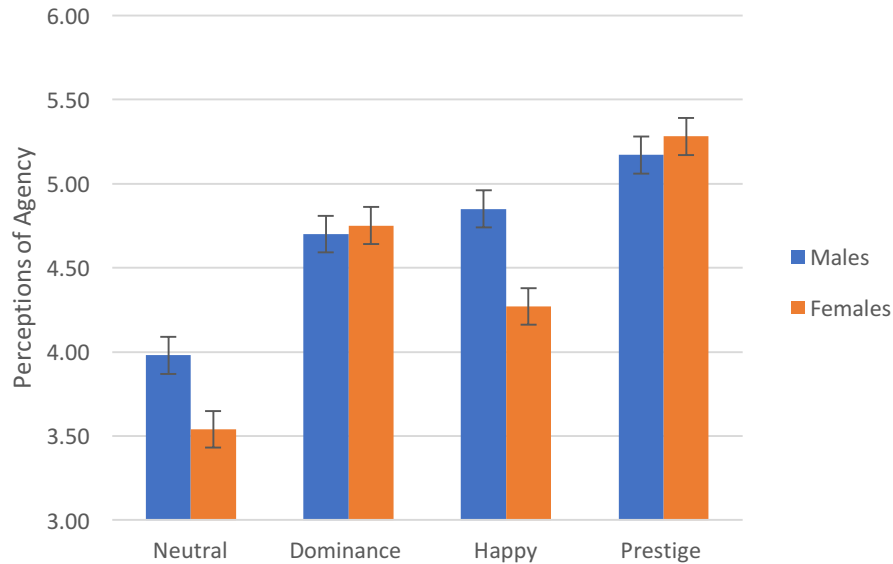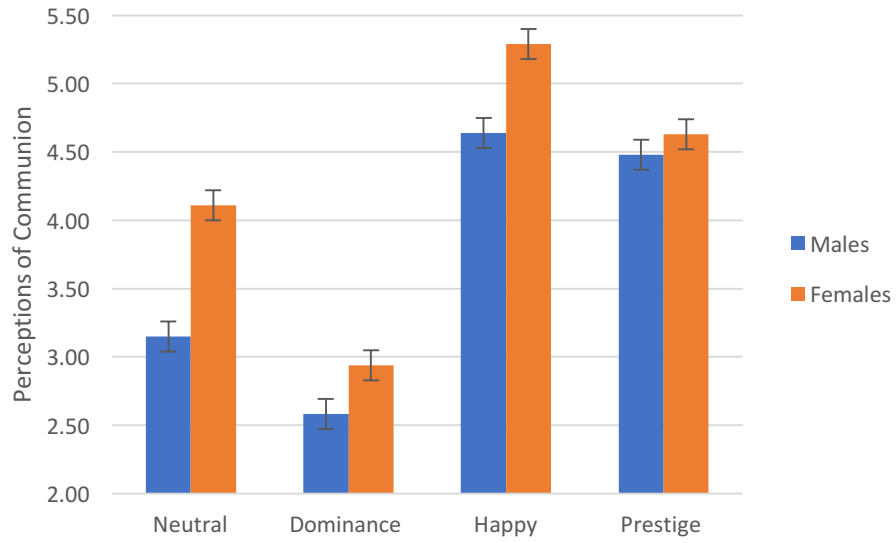
Figure S4. Sex by Display Interaction Predicting Agency, Study 3. Error bars indicate + / - 1SE.

Perceptions of Communion

As reported in the main text, a 2 (sex) x 4 (nonverbal display) mixed-model analysis of variance (ANOVA) was conducted on perceptions of communion. In addition to the main effects reported in text, we also observed a sex by display interaction, $F(3,654) = 6.83$, $p < .001$, $\eta_p^2 = .03$. Deconstructing this interaction indicated that among both men and women, the dominance display was perceived as significantly lower in communion compared to all other displays (ps < .001, ds ≥ .51), and the prestige display as significantly higher in communion compared to the dominance and neutral displays (ps < .001, ds ≥ .45), but among women the prestige display was perceived as lower in communion than the happy display ($p < .001$, $d = .58$), whereas for men these two displays did not differ in communion ($p = .84$, $d = .10$) This gender difference could be further evidence of a systematic bias to perceive females (but not males) as colder and therefore lower on communion when they engage in agentic nonverbal behaviors.

Figure S5. Sex by Display Interaction Predicting Communion, Study 3. Error bars indicate + / - 1SE.