

How Well Do Men's Faces and Voices Index Mate Quality and Dominance?

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Abstract Previous studies have used self-ratings or strangers' ratings to assess men's attractiveness and dominance, attributes that have likely affected men's access to mates throughout human evolution. However, attractiveness and dominance include more than isolated impressions; they incorporate knowledge gained through social interaction. We tested whether dominance and attractiveness assessed by acquaintances can be predicted from (1) strangers' ratings made from facial photographs and vocal clips and (2) self-ratings. Two university social fraternities, their socially affiliated sororities, and independent raters evaluated men's short- and long-term attractiveness, fighting ability, and leadership ability. Ratings made by unfamiliar men using faces, but not voices, predicted acquaintance-rated fighting and leadership ability, whereas ratings made by unfamiliar women from faces and voices predicted acquaintance-rated short- and long-term attractiveness. Except for leadership, self-ratings aligned with peers' evaluations. These findings support the conclusion that faces and voices provide valuable information about dominance and mate quality.

Keywords Attractiveness · Dominance · Face · Sexual selection · Voice · External validity

Women prefer particular features in men's faces (Burriss et al. 2011; Komori et al. 2009; Thornhill and Gangestad 1999; Welling et al. 2007; Zebrowitz et al. 2012) and voices (Feinberg et al. 2005b; Hodges-Simeon et al. 2010; Puts 2005), and men

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perceive particular features of men's faces (Perrett et al. 1998) and voices (Puts et al. 2007; Wolff and Puts 2010) to be markers of social and physical dominance. The stability of these results indicates that faces and voices advertise relevant information to mates and same-sex competitors, and that there may have been selection to perceive this information (Puts et al. 2012b). It is thus tempting to think that men's attractiveness and dominance can be relatively precisely ascertained from their faces and voices alone.

Most studies examining the influence of faces and voices on attractiveness and dominance have utilized only raters unfamiliar with the individuals presented in facial and vocal stimuli (but see, e.g., Kniffen and Wilson 2004; von Rueden et al. 2008, 2011). To our knowledge, no studies have examined how well independent ratings index overall attractiveness and dominance assessed by familiar social peers. Assessments of attractiveness and dominance have thus been made devoid of other pertinent information, such as personality and intelligence (Li et al. 2002), and in isolation from the complex webs of social relationships in which our Pleistocene ancestors most likely lived. While there is a general trend for findings in the psychological sciences to have external validity, subfields and individual research topics vary considerably in the extent to which lab results can be extrapolated to the real world (Mitchell 2012).

If men's faces and voices advertise mate quality and dominance to potential mates and competitors, then independent ratings should concur with outcomes in the field, and two results should be observed: First, independent ratings of attractiveness and dominance produced from facial and vocal stimuli should predict proxy measures of attractiveness and dominance, such as number of sex partners and fighting ability. Indeed, ratings made from men's facial photographs predicted upper body strength in traditional Bolivian and Andean groups (Sell et al. 2009), body attractiveness (Currie and Little 2009), aggressive behavior (Carré and McCormick 2008), personality traits (Penton-Voak et al. 2006), number of biological children (Jokela 2009), health (Kalick et al. 1998; Rhodes et al. 2003), hand strength (Fink et al. 2007), warriorship, status, and hunting ability in an Amazonian society (Escasa et al. 2010), and career promotions, final rank, and reproductive success of West Point graduates (Mueller and Mazur 1996, 1997). Similarly, aspects of men's voices predicted their number of sex partners (Puts 2005; Wolff and Puts 2010), shoulder-to-hip ratio (Hughes et al. 2004), bilateral symmetry (Hughes et al. 2002), weight and age (Bruckert et al. 2006), testosterone levels (Dabbs and Mallinger 1999; Evans et al. 2008; Puts et al. 2012a), upper body strength in the Tsimane and Andean horticulturalists (Sell et al. 2010), and number of children, perceived hunting ability (Apicella and Feinberg 2009; Apicella et al. 2007), height, weight, and upper body strength (Puts et al. 2012a) in Hadza foragers.

Second, independent ratings of attractiveness and dominance produced from facial and vocal stimuli should predict evaluations made by real-world potential mates and competitors—that is, by familiar men and women who are privy to the multitude of traits that characterize each man beyond his face and voice. The potential mates and male competitors with whom a man regularly interacts are precisely those individuals whose assessments are most relevant to his success in mating competition. Paradoxically, while the first type of (proxy) evidence is abundant, this second and arguably more fundamental evidence is lacking.

The current study therefore examines whether men's faces and voices reveal pertinent information to mates and competitors by testing whether strangers' ratings made

from male faces and voices predict overall attractiveness and dominance assessed by acquaintances. Such research requires samples in which members frequently interact and know each other well. We therefore recruited socially paired university social fraternities and sororities: tight-knit student societies that meet several times a week in social contexts, such as philanthropic functions and parties. Fraternity members rated each other and themselves on fighting ability and leadership, and sorority members rated fraternity members on attractiveness for short-term (sexual) and long-term (committed) relationships. We compared these ratings to independent ratings of dominance, leadership, and attractiveness from fraternity members' facial photographs and voice audio clips. If faces and voices contain relevant information about mate quality and/or dominance, then independent ratings made from facial photographs and voice audio clips should positively predict ratings of dominance and attractiveness made by social peers. Additionally, voice-based and face-based ratings should parallel each other, as they are predicted to advertise some of the same underlying qualities (Feinberg 2008; Feinberg et al. 2005a). Fighting and leadership ratings should also correlate, as facial and vocal features predict perceptions of leadership (Little et al. 2007; Tigue et al. 2012). Finally, short- and long-term attractiveness ratings are expected to parallel each other, as mate preferences are similar across mating contexts (see, e.g., Puts et al. 2013), even if some characteristics are weighted more heavily in certain mating contexts (Kenrick et al. 1990, 1993). We also explored the reliability of self-report measures in predicting ratings made by male and female peers.

Methods

Participants

We recruited members of two fraternities ($N=63$, mean age =19.9, $SD = 1.2$) and two sororities ($N=72$, mean age =19.4, $SD = 1.0$) from a large university in the northeastern United States. Each fraternity was socially affiliated with one of the sororities, with members attending joint social functions at least every three weeks. Participating fraternity members (male *participants*) were paid US\$15, and participating sorority members (female *participants*) were paid US\$10. We also recruited male ($N=35$, mean age =20.3, $SD = 2.5$) and female ($N=43$, mean age =19.0, $SD = 0.9$) *raters* from the university's psychology department subject pool. No raters were members of the participating sororities or fraternities. All methods were approved by the university's institutional review board.

Participant Procedures

We collected data at male participants' residence (fraternity) houses using a series of stations. The first station acquired informed consent; other stations collected photographs, voice recordings, answers to online questionnaires, and data not used in this study (see Hill et al. 2013). At each residence house, we dedicated a quiet room for making voice recordings. Male participants were recorded with a Shure SM58 vocal cardioid microphone, which was kept approximately 9.5 cm from the participants' mouths by a curved wire projection from the microphone stand. Voices were recorded

in mono with a sampling frequency of 44,100 Hz as male participants spoke the first six sentences of the Rainbow Passage (Fairbanks 1960). For facial photographs, participants were instructed to remove all earrings, glasses, and facial jewelry, and to use a headband if their hair covered any part of their faces. We asked participants to sit upright in a chair and to maintain a relaxed, neutral facial expression with the mouth kept lightly closed. Participants posed approximately 2 m from the camera, and the flash was always used. For online questionnaires, participants were seated privately. Male participants were asked what percentage of men they could defeat in a physical fight, how good a leader they were, and how attractive they were. All rating tasks used an 11-point Likert scale (0–10) except for the question “What percentage of men your age could you beat in a physical fight?” for which choices were listed from 0 to 100% in increments of 10%.

We standardized voice amplitude (71.5 ± 2.4 dB) using Praat version 5.3, and, in order to control for any differences across photographs in ambient light, we chose a photograph with ideal lighting and matched all other photographs to its brightness using the Match Color function in Adobe Photoshop CS6. Interpupillary distance was also standardized across photographs. One week after the initial data collection, we returned to the residences, at which time male participants were sequentially shown facial photographs of all other male participants from their fraternity and asked what percentage of men each could beat in a physical fight and how good a leader he was. The same scales used for self-assessments were used for assessment of other male participants. Order of rating tasks and presentation order of stimuli were randomized. For each participant, all of the stimuli for a particular dimension were rated before moving on to the next dimension. As before, participants were seated privately.

Female participants were brought individually into the lab, sequentially shown facial photographs of all male participants from their affiliated fraternity on a computer, and asked to rate on a 10-point Likert scale how attractive each was for a “short-term, purely sexual relationship, such as a one night stand” and for a “long-term, committed relationship, such as marriage.” Rating task and stimulus presentation order were randomized as above.

Independent Male and Female Rater Procedures

Independent male and female raters viewed photographs of the male participants’ faces and listened to recordings of male participants reading the first sentence of the Rainbow Passage. The face and voice stimuli were split randomly into two sets so each independent rater rated half of the stimuli but all stimuli were evaluated an equal number of times. Male raters evaluated faces and voices for fighting and leadership abilities, whereas female raters evaluated faces and voices for short- and long-term attractiveness. The same questions and scales used for the male and female participants were used with the independent raters. For each rater, all of the stimuli for a particular dimension were rated before moving on to the next dimension. Rating task and stimulus presentation order were randomized as above.

Correspondence between self-ratings, independent ratings, and ratings made by familiar individuals were assessed via multiple regression models and Pearson correlations. All statistical tests were two-tailed and considered significant if $p < 0.05$.

Results

Intraclass Correlations

Intraclass correlations were computed to determine inter-rater reliability. For each face, some data were missing because male participants rated other members, but not themselves. Thus, to compute inter-rater reliability in a way not likely to bias existing ratings, we imputed a random value from the pool of observed ratings for each missing value. Average two-way agreement intraclass correlations were computed for each variable for each fraternity, as members of one fraternity did not rate members of the other fraternity. Data from one independent male rater were removed because he gave all faces a rating of 10. Six female participants' ratings were removed because they were missing more than 16 of 34 trials. All intraclass correlations were high, at >0.67 (Table 1).

Status Among Men

Ratings of fighting ability made by independent male raters significantly predicted independent ratings of leadership ability made by these men for both facial photos ($r_{59}=0.48$, $p<0.0001$) and voice recordings ($r_{52}=0.35$, $p=0.012$), and ratings of fighting ability made by male participants (acquaintances) predicted ratings of leadership made by these men ($r_{58}=0.50$, $p<0.0001$).

A multiple regression model predicting ratings of fighting ability ($R^2=0.13$, $F_{2,48}=3.54$, $p=0.037$) showed that face ($\beta=0.56$, $p=0.025$), but not voice ($\beta=0.27$, $p=0.307$), ratings made by independent male raters significantly predicted ratings made by male acquaintances. A similar model predicting male acquaintances' ratings of leadership approached but did not reach statistical significance ($R^2=0.1$, $F_{2,48}=2.64$, $p=0.081$) (Table 2). When the interaction between face and voice ratings was added to each model (both fighting ability and leadership models), it was not statistically significant in either (both $p>0.89$).

Table 1 Inter-rater reliability: intraclass correlations

	Male		Female	
	Acquaintances	Independent raters	Acquaintances	Independent raters
Fighting 1	0.95	0.68		
Fighting 2	0.91	0.91		
Leadership 1	0.95	0.80		
Leadership 2	0.95	0.81		
Short-term 1			0.80	0.80
Short-term 2			0.81	0.81
Long-term 1			0.90	0.87
Long-term 2			0.95	0.89

Table 2 Post-hoc tests (Pearson correlations) of independent face and voice ratings

	Independent ratings	
	Faces	Voices
Fighting	0.56*	0.27
Short-term attractiveness	0.88***	0.15
Long-term attractiveness	0.57***	0.16*

* $p < 0.05$, ** $p < 0.01$,
 *** $p < 0.001$

We then analyzed ratings of fighting and leadership ability made from voices and faces separately. Fighting ability ($r_{58}=0.37, p=0.004$) and leadership ability ($r_{58}=0.27, p=0.037$) rated by independent male raters from facial photos significantly predicted equivalent ratings made by male acquaintances. However, independent men’s ratings of fighting ability ($r_{51}=0.18, p=0.213$) and leadership ($r_{51}=0.18, p=0.205$) from vocal recordings did not significantly predict equivalent ratings made by male acquaintances (Table 3).

Attractiveness to Women

Ratings of short-term attractiveness made by independent female raters significantly predicted ratings of long-term attractiveness made by these women for both facial photos ($r_{59}=0.94, p < 0.0001$) and voice recordings ($r_{52}=0.84, p < 0.0001$), and ratings of short-term attractiveness made by female participants (acquaintances) predicted ratings of long-term attractiveness made by these women ($r_{58} = 0.92, p < 0.0001$).

A multiple regression model predicting short-term attractiveness ($R^2=0.41, F_{2,48}=16.87, p < 0.001$) showed that face ratings made by independent female raters significantly predicted ratings made by female acquaintances ($\beta=0.88, p < 0.001$), and voice ratings made by independent female raters marginally significantly predicted ratings made by female acquaintances ($\beta=0.15, p=0.069$). A multiple regression model predicting long-term attractiveness ($R^2=0.26, F_{2,48}=8.58, p=0.001$) showed that face ($\beta=0.57, p=0.001$) and voice ($\beta=0.16, p=0.03$) ratings made by independent female raters significantly predicted ratings made by female acquaintances (Table 2). When the interaction between facial and vocal attractiveness was added to each model (both short- and long-term), it was not statistically significant in either (both $p > 0.51$).

Table 3 Zero-order correlations between acquaintances’ ratings and independent and self-ratings

	Independent ratings		Self-ratings
	Faces	Voices	
Fighting	0.37**	0.18	0.31*
Leadership	0.27*	0.18	0.03
Short-term attractiveness	0.54***	0.28*	0.52*** ^a
Long-term attractiveness	0.39***	0.31*	0.52*** ^a

^aParticipants rated themselves on “attractiveness,” not short- and long-term attractiveness
 * $p < 0.05$, ** $p < 0.01$,
 *** $p < 0.001$

We then analyzed ratings made from faces and voices separately. Men's short- and long-term facial attractiveness to independent female raters significantly predicted short-term ($r_{58}=0.54$, $p<0.0001$) and long-term ($r_{58}=0.39$, $p=0.002$) attractiveness ratings made by female acquaintances, respectively. Men's short-term ($r_{51}=0.28$, $p=0.050$) and long-term ($r_{51}=0.31$, $p=0.026$) vocal attractiveness to independent female raters also predicted short- and long-term attractiveness ratings made by female acquaintances, respectively (Table 3).

Self-Ratings

Male participants' self-ratings of fighting ability ($r_{58}=0.31$, $p=0.019$), but not leadership ($r_{58}=0.03$, $p=0.845$), significantly predicted equivalent ratings made by male acquaintances. Self-ratings of overall attractiveness significantly predicted ratings of short- ($r_{58}=0.52$, $p<0.0001$) and long-term ($r_{58}=0.52$, $p<0.0001$) attractiveness made by female acquaintances (Table 3).

Discussion

To our knowledge, this is the first study to show that independent laboratory ratings of men's facial photographs and voice clips predict judgments made by their social peers. Using multiple regression models, we found that independent men's ratings of other men's faces, but not voices, predicted fighting ability ratings made by male acquaintances. Independent women's ratings of men's faces and voices for both short- and long-term attractiveness predicted ratings made by female acquaintances. Independent men's ratings of men's voices and faces did not significantly predict leadership ability ratings made by male social peers.

These results indicate that men's faces and voices reveal pertinent information to potential mates and competitors. Such results are to be expected if same-sex competitors and potential mates utilize multiple converging cues to assess formidability and mate quality, respectively. Any single cue provides incomplete information—for example, size predicts physical prowess, but a large man may nevertheless be slow, uncoordinated, unskilled, weak, or timid. The use of multiple cues, possibly including facial appearance and/or voice quality, can increase assessment accuracy.

We also examined face and voice ratings separately. Independent male raters viewed men's facial photographs, and their assessments of the men's fighting and leadership ability predicted those assigned by social acquaintances. Similarly, when independent female raters judged men's facial photographs for short- and long-term attractiveness, their assessments positively predicted ratings made by women who were personally familiar with those men. These results support the idea that men's faces provide information about mate value and dominance. Furthermore, these results build on previous research, which found that strangers' ratings of attractiveness of men's static photographs correlate with their ratings of attractiveness made from short video clips of those same men rotating their head from side to side (Rhodes et al. 2011). Since, in the present study, strangers' ratings from facial photographs predicted "real-world" ratings, these results speak to the external validity of independent ratings of faces on dominance and attractiveness made in the laboratory.

Results from voice ratings were more mixed. Ratings of men's vocal attractiveness made by unfamiliar women significantly predicted ratings made by women who frequently socialized with the men. However, there was no significant relationship between ratings of fighting ability and leadership made by unfamiliar men listening to voice recordings and ratings made by male acquaintances, though the correlations were in the predicted direction. These results are puzzling, since independent male raters give consistent ratings of dominance using voice clips in the lab (Hodges-Simeon et al. 2010; Puts et al. 2006). Indeed, vocal features predict mating and reproductive success (Apicella et al. 2007; Hodges-Simeon et al. 2011; Puts 2005), and when considering leadership positions such as presidencies, people in laboratory settings vote for candidates with lower-pitched voices (Tigue et al. 2012).

One possible explanation for this discrepancy is that, although masculine vocal characteristics such as low pitch produce consistent impressions of dominance among listeners, these impressions are largely false (Collins 2000; Pisanski et al. 2012; Rendall et al. 2007). However, some studies have found that ratings and acoustic measurements of men's voices predict such relevant characteristics as size, strength, and testosterone levels (Bruckert et al. 2006; Dabbs 1990; Evans et al. 2006, 2008; Puts et al. 2012a; Sell et al. 2010). Perhaps men's voices provide sufficient information regarding formidability to warrant attention, but relationships between men's voices and formidability are modest enough not to achieve statistical significance in samples of moderate size, such as in the present study. Additionally, men's voices may respond to the relative dominance of their competitors (Puts et al. 2006). This situational information may bear greater weight on perceptions of dominance than do static vocal characteristics. If so, then lack of agreement in ratings may stem from fraternity members' greater access to this dynamic vocal information. Because they were being recorded, male participants could also have altered their voices in a way that would reduce salient information (e.g., raising pitch as a result of anxiety). Facial data might be less likely to be altered by data collecting processes than vocal data. Finally, because male participants lived together, their greater familiarity could have enabled characteristics other than voice and facial appearance to have stronger effects on their ratings, whereas female acquaintances were likely less familiar and thus may have been more influenced by superficial characteristics, such as the men's voices and faces. Indeed, this is consistent with findings that, whereas people perceive more masculine vocal characteristics to be associated with larger body size, these characteristics are often weakly associated with body size, if at all, in adult men (Pisanski et al. 2012; Rendall et al. 2007; Sell et al. 2010). More research regarding this discrepancy is needed.

As predicted, voice and face-based ratings were correlated, supporting the idea that faces and voices partly advertise the same underlying qualities. However, multiple regression analyses revealed that ratings from faces and voices also made significant independent contributions to long-term attractiveness, and the independent contribution of voice ratings to short-term attractiveness was marginally statistically significant. These results indicate that faces and voices also provide partly unique information about mate quality.

Fighting and leadership ratings were positively correlated, suggesting that better fighters are more likely to be leaders in this population. Ratings of short-term attractiveness were highly correlated with ratings of long-term attractiveness in both the independent raters and female peers, supporting the idea that mate preferences are

similar across mating contexts. This finding is consistent with previous studies which also found that ratings of short- and long-term attractiveness correlate strongly (e.g., Puts et al. 2013).

In addition to comparing peer ratings to independent ratings, we compared peer ratings to self-ratings. Self-ratings of short-term attractiveness, long-term attractiveness, and fighting ability agreed with peers' ratings, whereas self-ratings of leadership did not. The lack of a relationship between male participants' self-ratings of leadership and their peers' ratings mirrors previous research; men are generally inaccurate in their assessment of their ability to lead others (see Fleenor et al. 2010). One reason may be that men receive less feedback on their leadership ability than they do on their fighting ability (whether they win or lose physical contests) and attractiveness (interest or rejections from potential mates), which have clear outcomes.

The current study has the following limitations. Although fraternities and sororities afford the opportunity to sample well-acquainted individuals, their idiosyncrasies may limit the degree to which these results extend to other populations. However, fraternities may be representative of their local population in areas such as race and sexuality (Anderson 2008). Moreover, some characteristics of fraternities (e.g., alliances of a few dozen men, often within a climate of hegemonic masculinity; Rhoads 1995; Vreeland 1942) parallel conditions in traditional societies (Hill et al. 2011; Smuts 1995), possibly increasing this population's relevance to questions of human evolution. And while foraging coalitions frequently include many kin, whereas fraternities and sororities typically do not, it is worth noting that fraternity and sorority members refer to each other as "brothers" and "sisters." Thus, although fraternities clearly differ from traditional coalitions, the two share several potentially relevant similarities. Another possible limitation of the current study is that, during rating tasks, we identified male participants to their male and female acquaintances using facial photographs, which may have bolstered correlations with ratings made by independent raters viewing facial photographs. However, it seems unlikely that viewing facial photographs would reduce in salience the intricate social knowledge of the male participants that close peers already possess (Kniffen and Wilson 2004). Indeed, the human brain is specialized for recognizing people and diverse associated information such as names, personal characteristics, and relevant interpersonal interactions from facial appearance (Paller et al. 2003). Finally, future research should explore objective measures of faces and voices (e.g., facial masculinity and voice pitch) and the roles they play in attractiveness and dominance assessed by acquaintances. (For such an exploration using this data set, see Hill et al. 2013.)

The current study provides evidence that independent female ratings of sexual and romantic attractiveness made from men's facial photographs and voice recordings predict assessments made by women who know these men. Furthermore, independent male ratings of fighting and leadership abilities made from photographs of men's faces, though not from clips of men's voices, predict assessments made by familiar men. This research is the first to find concordance between lab and field ratings of attractiveness and dominance. Effect sizes were generally medium to large (Cohen 1988) but, perhaps unsurprisingly, left considerable variance to be explained by characteristics other than faces and voices. The current study gives empirical support to the external validity of research using faces and voices to test evolutionary hypotheses about male attractiveness and dominance, while adding to the cumulative literature on the selection

pressures that have shaped humans' ability to extract relevant information from others' faces and voices.

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