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Visual attention to powerful postures: People avert their gaze from nonverbal dominance displays

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HIGHLIGHTS

- Assessed visual attention to targets in dominant vs. submissive nonverbal postures
- People avert their gaze from faces and upper bodies of others displaying dominance.
- However, they gaze more at the legs of those displaying dominance (vs. submission).
- This may allow observers to monitor the movements of threatening, dominant others.

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ABSTRACT

This paper investigates whether humans avert their gaze from individuals engaging in nonverbal displays of dominance. Although past studies demonstrate that both humans and nonhuman primates direct more visual attention to high-status others than low-status others, non-human primates avert their gaze when high-status conspecifics engage in nonverbal dominance displays (e.g., chest pounding). In two experiments, participants were eye-tracked while viewing photographs of men and women adopting either dominant, high-power (i.e., expansive and open) or submissive, low-power (i.e., contractive and closed) nonverbal postures. Results demonstrated that humans, like primates, avert their gaze from the faces and upper bodies of individuals displaying dominance compared to those displaying submissiveness. Not only did participants look less often at the faces and upper bodies of dominance-displaying individuals, they also fixated on these regions for shorter durations. Our findings ultimately suggest that nonverbal dominance displays influence humans' visual attention in ways that are likely to shape how social interactions unfold.

1. Introduction

Status hierarchies are ubiquitous among social species. An individual's status is the extent to which he or she is respected and admired by others in the hierarchy (Magee & Galinsky, 2008). In human societies, high-status individuals have the capacity to allocate resources, influence group decisions, set norms for appropriate behavior, incite conflict, and resolve disputes (Anderson & Berdahl, 2002; Keltner, Gruenfeld, & Anderson, 2003; Magee & Galinsky, 2008). It is perhaps no surprise, then, that previous research shows humans attend more to high-status individuals than to those who do not hold such influence (Kleinke, 1986). For example, people better recognize and attend more to the faces of high-status individuals than those of low-status individuals (Ratcliff, Hugenberg, Shriver, & Bernstein, 2011), and spend more time looking at photographs of men wearing business suits (i.e., high-status) compared to men wearing workout clothes (i.e., low-status) (DeWall & Maner, 2008; Maner, DeWall, & Gailliot, 2008). In addition, when watching videos of a group involved in a decision-making task, participants look more at the group members who have been rated as high-status by their peers than at group members who have been rated as low-status by their peers (Foulsham, Cheng, Tracy, Henrich, & Kingstone, 2010). Humans not only concentrate their gaze more on high-status individuals than low-status individuals, they also shift their attention to look at what high-status individuals are looking at, a phenomenon known as gaze cuing (Dalmaso, Pavan, Castelli, & Galfano, 2011). These behaviors allow low-status individuals to attend to those who control their outcomes (Fiske & Dépret, 1996), glean valuable information about how to behave and where to focus their attention (Deutsch & Gerard, 1955), and monitor a potential threat (Keltner et al., 2003).

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Nonhuman primates also tend to pay more attention to those who have high social status. Not only have non-human primates also been shown to engage in gaze cuing (e.g., rhesus macaques reflexively follow the gaze of other high-status, but not low-status, macaques; Shepherd, Deaner, & Platt, 2006), they also generally concentrate their gaze more on high status others compared with low status others (e.g. Chance, 1967; Pannozzo, Phillips, Haas, & Mintz, 2007). For example, both baboons and gorillas frequently and repeatedly glance to where they last saw the high-status individual, and, if he has moved, scan the area to find his new location (Chance, 1967). Moreover, high-status gorillas tend to occupy the optimal physical location to be seen by all their subordinates – at the front of a fast-moving group and at the center of a slow-moving or resting group (Chance, 1967).

However, this pattern of visual attention reverses when high-status nonhuman primates adopt conspicuous nonverbal displays of dominance; primates avert their gaze from high-status individuals who are engaging in dominance displays or intimidation tactics (de Waal, 1982). If primates do not learn to avert their gaze in face-to-face interactions with dominant others, they risk being chased or attacked in response (Chance, 1967; Coss, Marks, & Ramakrishnan, 2002). To signal submission and appeasement, chimpanzees and gorillas avert their gaze from individuals who are displaying dominance (de Waal, 1982; Sicotte, 2002). For example, chimpanzees bow their heads, present their backsides to, and kiss the feet, neck or chest of an ape who is physically displaying dominance (de Waal, 1982). The dominant ape usually responds to these submissive displays by further exaggerating his dominance display, "stretching himself up to a greater height and making his hair stand on end" (de Waal, 1982, p. 87); the submissive ape's gaze aversion reinforces the group's status hierarchy. Among nonhuman primates, conspicuous staring generally communicates aggression, whereas gaze aversion tends to reduce conflict (Coss et al., 2002).

In sum, both humans and nonhuman primates visually attend more closely to higher-status individuals compared to lower-status individuals. However, conspicuous displays of dominance elicit the opposite response in nonhuman primates – gaze aversion. Whether humans engage in similar behavior remains largely unexplored. Some research suggests, however, that individuals' gaze behavior is sensitive to the dynamics of social hierarchies. For instance, when participants watch videos of highly ranked others and are told that their gaze behavior will be subsequently viewed by those in the video, they look less at the targets' eyes (Gobel, Kim, & Richardson, 2015). No research to date, however, has explored the impact of conspicuous nonverbal dominance displays on visual attention. Here, we examine whether humans, like non-human primates, avert their gaze from dominance-displaying individuals.

In line with the primate literature, *we hypothesize that humans will avert their gaze more from targets displaying nonverbal dominance than they will from targets displaying nonverbal submissiveness. Specifically, because signaling submission involves lowering one's gaze, we predict that people will look less at the faces and upper bodies of targets displaying dominance relative to targets displaying submissiveness, but that they will attend more to the lower bodies of targets displaying dominance than targets displaying submissiveness*.

To test these hypotheses, we conducted two experiments in which we used an eye-tracker to monitor participants' eye movements as they viewed images of male and female targets, shown displaying either nonverbal dominance or submissiveness (see Methods for experimental details). We assessed visual attention via two dependent variables – how frequently participants fixated on (i.e., looked at) the target (as a proportion of total number of fixations) and for how long (as a proportion of time spent fixating). We examined these two dependent variables for the entire target (i.e., the entire body). Lower values on our two dependent measures indicate greater gaze aversion from the entire target. We also examined visual attention to three specific areas of the targets' bodies: the face, the upper body, and the lower body. Lower values on our two dependent measures for the face and upper body would indicate greater gaze aversion (i.e., looking less often and for less time). For the lower body, however, higher values on our two dependent measures indicate greater gaze aversion (i.e., looking away from the face and upper body of the target).

2. Experiment 1

2.1. Method

2.1.1. Participants

We recruited all participants from a laboratory participant pool and paid them for their participation. We planned to run a minimum of 25 people in each condition and committed to running participants until the end of the spring semester. Experiment 1 included 85 participants, of which 11 were excluded (nine who fixated less than 50% of the time and two due to a computer malfunction), resulting in an *n* of 74 (36 males, 33 females, 5 unspecified). Of the final sample, 38 participants were assigned to the high-power condition, and 36 to the low-power condition. The sample consisted of 42 participants aged between 18 and 25 years, 19 participants aged 26–35, 1 participant in the 36–45 age bracket, 4 participants aged 46–55, 3 participants aged 56 and over, and 5 participants who did not specify their age. The majority of the sample was either White (47.3%), Asian (23.0%) or Black/African American (9.5%).

2.1.2. Stimuli

The stimulus set consisted of 60 color photos of three men and three women, each depicted in five dominant, high-power poses and five submissive, low-power poses (see Fig. 1 for sample images). All photos were taken by the researchers in a well-lit laboratory room on campus. The ten poses were selected from the established literature on human nonverbal displays of dominance versus submissiveness and varied on the two dimensions directly linked with nonverbal power and dominance: expansiveness (i.e., the amount of occupied space) and openness (i.e., limbs opened or closed) (Carney, Cuddy, & Yap, 2010; Carney, Hall, & LeBeau, 2005; Cuddy, Wilmuth, Yap, & Carney, 2015; Hall, Coats, & LeBeau, 2005). Apart from gender, the six targets also differed in terms of attractiveness, clothing, and race, with a mix of Asian, Black, and White targets presented. Each image depicted the target within a naturalistic, unadorned, indoor setting. Images were cropped to 6 ¾″ × 9 ¾″ (716 × 964 pixels) and were centered on the screen.

2.2. Procedure

In both experiments, participants viewed a series of images of targets as a Tobii T60 Eye Tracker recorded their gaze behavior. The eye-tracker had a sampling rate of 60 Hz and a screen resolution of 1280 × 1024 pixels. Participants sat at a viewing distance of 60 cm from the monitor, with their eye height aligned with the horizontal midline of the monitor (done by raising or lowering the monitor with the aid of the adjustable arm). Stimuli were presented on the screen via the Tobii Studio package.

Participants were instructed to look at a series of images of men and women in different physical positions while having their gaze eye-tracked. We told participants that they would be rating their impressions of each target after seeing multiple images of that target in various physical positions. Participants were randomly assigned to view a series of 30 photographs of targets in either a series of dominant or a series of submissive poses. Half of the participants viewed the male targets first, and half viewed the female targets first. Within each gender, the three targets were presented in a standardized order. Although each participant viewed images of all six targets (three men, three women), each participant viewed only one type of pose: either dominant or submissive. In other words, each participant saw either six targets in dominant poses, or six targets in submissive poses.

Participants first completed a 5-point adult calibration procedure, in which they were required to follow a small red dot with their eyes as it

Fig. 1. Examples of stimuli used in Experiment 1.

appeared in five different locations on the screen. This was done to ensure that the eye-tracker was correctly recording participants' eye movements. Then participants completed six blocks – one for each of the six targets. Each block contained a series of five images, each of which was presented for eight seconds. Participants saw a blank black screen for one second after each image. As a manipulation check, participants rated their overall perceptions of the targets' power and submissiveness (reverse-scored) on 7-point scales ($\alpha = 0.79$). In addition, to reduce the salience of the questions about power, participants also rated the target's perceived warmth and competence (see Supplemental Materials for items, reliabilities, and descriptives). Following all six blocks, participants provided demographic information.

2.2.1. Data analysis

Fixations were defined from the raw gaze data using the Tobii Studio Software's velocity threshold identification (I-VT) filter set to its default parameters, which excluded fixations below 60 ms (Olsen, 2012). To examine which aspects of the stimuli participants were fixating on, we created areas of interest (AOIs) using Tobii Studio. Specifically, for each image we created three non-overlapping AOIs – one encompassing the target's face, one encompassing the upper body (i.e., arms and chest), and one encompassing the lower body (i.e., lower torso and legs). We also created a fourth AOI capturing fixations on the target overall by summing face, upper body, and lower body AOIs.

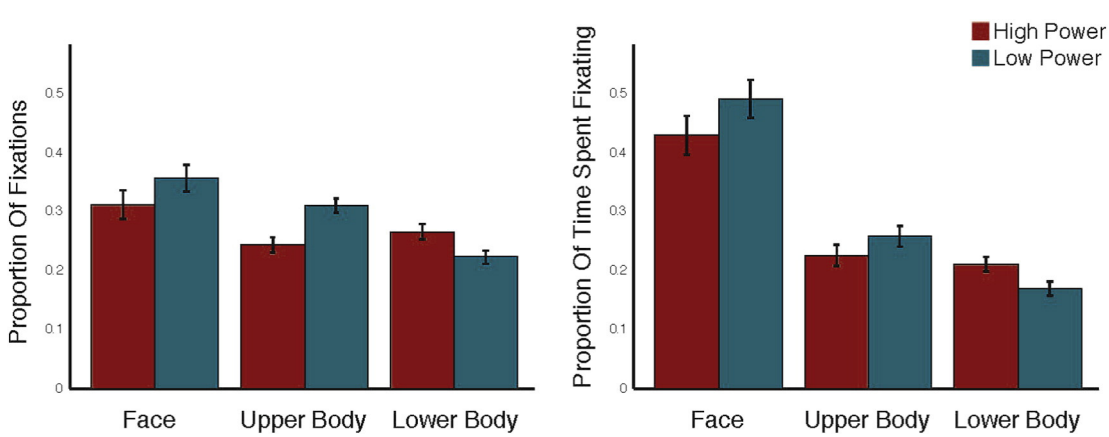

Fig. 2. Proportion of fixations and time spent fixating across each body region (Experiment 1). Error bars indicate ±1 SEM.

To test our hypothesis that people would avert their gaze from targets in dominant poses, we used two dependent variables – the average proportion of fixations on each AOI, and the average proportion of time spent fixating on each AOI. We calculated the average proportion of fixations on each AOI by dividing the average number of fixations on that AOI by the total number of fixations on that image (including all fixations on the target and the background). Therefore, the average proportion of fixations represents how many times participants looked at a particular area of the targets' bodies as a function of how many times they looked at the image overall, with lower values reflecting gaze aversion. We chose to analyze the proportion of fixations rather than the raw fixation count as this enabled us to control for possible variation in the amount of time the participant may have looked at the image overall, thus providing us with a more precise, but also more conservative, measure of gaze aversion than if we had used raw fixation count. Average proportion of time spent fixating on each AOI was calculated by taking the average fixation duration on the AOI and dividing it by the average fixation duration for each image overall. Hence, its value represents the amount of time participants fixated on an area of the targets' bodies as a function of how much time they spent fixating on the entire image. Across both experiments, we created these two outcome measures for each of the four AOIs: entire body, face, upper body, and lower body. Note that in two of the submissive-displaying images, the target was presented with his/her hand covering the mouth area. To prevent overlapping AOIs, for both of these images, fixations in this region were coded as belonging to the face AOI, rather than the upper body AOI.

All reported analyses are based on a 2 (target display: dominant vs. submissive) × 2 (target gender: male vs. female) × 2 (participant gender: male vs. female) mixed-model design, with target power pose and participant gender as between-subjects factors, and target gender as a within-subjects factor.[1] The order in which participants rated the targets (i.e., male first or female first) did not have a systematic effect on any of the dependent variables, and thus, this variable was excluded from all reported analyses (all $ps > 0.09$). Because neither target gender nor participant gender was the main variable of interest in this study, we have also not reported these analyses in the main text.

2.3. Results

A manipulation check revealed that, as predicted, participants viewed the targets as more powerful when displaying dominance ($M = 4.64$, $SE = 0.12$) compared to submissiveness ($M = 3.75$, $SE = 0.13$), $F(1,65) = 26.24$, $p < 0.001$, $\eta_p^2 = 0.29$; 95% CI [0.12, 0.44].[2]

In clear support of our hypotheses, participants fixated significantly less often on targets displaying dominance ($M = 0.82$, $SE = 0.02$) than targets displaying submissiveness ($M = 0.89$, $SE = 0.02$), $F(1,65) = 10.52$, $p = 0.002$, $\eta_p^2 = 0.14$; 95% CI [0.02, 0.29], and spent less time fixating on targets displaying dominance ($M = 0.87$, $SE = 0.02$), than on targets displaying submissiveness ($M = 0.92$, $SE = 0.02$), $F(1,65) = 5.19$, $p = 0.03$, $\eta_p^2 = 0.07$; 95% CI [0.00, 0.22]. In other words, participants looked more often, and spent more time looking at, targets displaying submissiveness than dominance.

We did not find support for our hypothesis that participants would fixate more on the faces of targets displaying submissiveness than dominance. Although the impact of pose on attention to the face was in the predicted direction, with people fixating more often on the faces of targets displaying submissiveness ($M = 0.36$, $SE = 0.02$) compared to the faces of targets displaying dominance ($M = 0.31$, $SE = 0.02$), and fixating for longer on the faces of targets displaying submissiveness ($M = 0.49$, $SE = 0.03$) compared to targets displaying dominance ($M = 0.43$, $SE = 0.03$), these differences did not reach the level of statistical significance, $F(1,65) = 1.84$, $p = 0.18$, $\eta_p^2 = 0.03$, and, $F(1,65) = 1.74$, $p = 0.19$, $\eta_p^2 = 0.03$, respectively. Participants did, however, differ significantly in the extent to which they fixated on targets' upper bodies. Participants fixated significantly less often on the upper bodies of targets displaying dominance ($M = 0.24$, $SE = 0.01$) compared to targets displaying submissiveness ($M = 0.31$, $SE = 0.01$), $F(1,65) = 14.59$, $p < 0.001$, $\eta_p^2 = 0.18$; 95% CI [0.04, 0.34]. There was, however, no effect of pose on the proportion of time spent fixating on targets' upper bodies, $F(1,65) = 1.66$, $p = 0.20$, $\eta_p^2 = 0.03$.

Fig. 3. Examples of stimuli used in Experiment 2.

In contrast, and in line with our hypotheses, participants fixated more often on the lower bodies of targets displaying dominance ($M = 0.27$, $SE = 0.01$) than targets displaying submissiveness ($M = 0.22$, $SE = 0.01$), $F(1,65) = 6.16$, $p = 0.02$, $\eta_p^2 = 0.09$; 95% CI [0.00, 0.23], and spent significantly more time fixating on the lower bodies of targets displaying dominance ($M = 0.22$, $SE = 0.01$) compared to targets displaying submissiveness ($M = 0.17$, $SE = 0.01$), $F(1,65) = 6.14$, $p = 0.02$, $\eta_p^2 = 0.09$; 95% CI [0.00, 0.23] (Fig. 2).

2.4. Discussion

Experiment 1 demonstrates that individuals avert their gaze from those who engage in conspicuous nonverbal displays of dominance.

[1] As an alternative statistical approach, we also ran the same analyses including AOI as a within-subjects factor. Across both experiments, the results were comparable to those reported in the manuscript, with the differences between dominant and submissive conditions remaining unchanged.

[2] All CIs reported reflect intervals around partial eta squared.

Participants fixated less often and for shorter durations on targets shown adopting a dominant, high-power posture, compared to targets shown adopting a submissive, low-power posture. Specifically, when presented with an individual displaying nonverbal dominance, participants fixated less often on the target's upper bodies, and were more likely to avert their gaze to their lower body (i.e., lower torso and legs).

Unexpectedly, we did not find evidence that individuals would avert their gaze from the faces of targets adopting dominant postures more so than submissive postures. One possible explanation for this is that none of the targets were looking into the camera (i.e., directly at the participant). Indeed, attending to the face of a dominant individual while their attention is directed elsewhere allows one to gather information while not violating status norms (e.g., Risko, Richardson, & Kingstone, 2016). At the same time, however, research demonstrates that the direct gaze of others captures attention (Senju & Hasegawa, 2005), and that individuals attend more to the faces of threatening targets when displaying direct gaze, compared to averted gaze (Trawalter, Todd, Baird, & Richeson, 2008).

3. Experiment 2

The purpose of Experiment 2 was to test our hypotheses using stimuli that were more standardized than the stimuli used in Experiment 1. Although only pose type (dominant vs. submissive) varied between conditions in Experiment 1, the stimuli did include items in the backgrounds of the images (e.g., tables, doors), and the targets wore potentially eye-catching clothing that could have influenced participants' gaze behavior. Because these features of our stimuli did not vary between conditions, they should not have caused the effects found in Experiment 1. However, we wished to ensure that the effects found in Experiment 1 would replicate when using standardized stimuli. Further, we wished to test whether we would find support for our hypothesis that individuals would avert their gaze from the faces of dominance-displaying targets when the targets gazed directly toward the participant. Therefore, we created a new set of photographs for Experiment 2, in which all targets wore identical, muted clothing (i.e., a black t-shirt and black pants) and all background features were digitally removed from the images. Further, we instructed all of the actors to gaze directly at the camera.

3.1. Method

3.1.1. Participants

We a priori elected to run at 25 participants per counterbalanced condition (low power: male images then female images, low power: female images then male images, high power: male images then female images, high power: female images then male images) and continued to run until those quotas were reached. One hundred and nineteen participants took part in the study, of which 20 were excluded (three who fixated less than 50% of the time, seven due to poor calibration, five due to procedural errors, and five due to a computer malfunction), resulting in an n of 99 participants (50 males, 49 females), who ranged in age from 18 to 68 years ($M_{age} = 27.23$ years). The majority of the sample reported being White (53.5%), Asian (21.2%) or Black/African American (12.1%). The final sample consisted of 51 participants in the high power condition (24 female first, 27 male first) and 48 participants in the low power condition (25 female first, 23 male first).

3.1.2. Stimuli

The stimuli consisted of 28 color photographs of one man and one woman, each depicted in seven dominant, high-power poses and seven submissive, low-power poses. As in Experiment 1, these images were selected from the literature on nonverbal dominance versus submission (see Fig. 3 for sample images). All photos were taken by the researchers in a well-lit indoor lab setting on campus. Although the poses were similar to Experiment 1, the Experiment 2 images differed from the Experiment 1 images in several ways. First, we standardized them, such that both targets wore identical clothing (black t-shirt, dark jeans, and black shoes). Second, we edited the images with Adobe Photoshop to remove the background of the scene from view. Thus, the targets were shown in front of a plain white background rather than in the context of a naturalistic setting. Third, we controlled for direction of eye gaze by having each target look directly at the camera. Although we removed extraneous objects from the images, we did not remove objects from the background that the target was using. For instance, if the target was seated, all aspects of the chair were kept in the image. Similarly, in one dominance-displaying pose, the target was shown resting his/her feet on a table. As such, the full table was left in the image.

We standardized all images at 1000 pixels in height. However, the width of each image slightly varied, depending on the expansiveness of the target, and whether or not there were other objects (i.e., a chair or table) in view. The dominance images therefore tended to be slightly larger than the submission images: dominant targets took up an average of 174,020 pixels (or 13.28% of the screen) whereas submissive targets took up an average of 133,086 pixels (or 10.15% of the screen). This allowed for an even more conservative test of our hypothesis, enabling us to demonstrate that people avert their gaze from dominance-displaying targets even though displays of dominance take up a greater proportion of the screen than displays of submission. All images were centered on the screen.

3.2. Procedure

Experiment 2 followed a similar procedure to that used in Experiment 1, with participants randomly assigned to view targets in either dominant or submissive poses, and to view either the male or the female target first. After completing a 9-point calibration procedure, participants took part in two experimental blocks. Each block contained a series of seven images, with each image presented for eight seconds. After each image participants saw a white screen for two seconds. At the end of each block, participants rated the target's perceived power, warmth, and competence, with the same items used in Experiment 1. After completing both blocks, participants provided demographic information.

The data were analyzed using the same standards and analyses as Experiment 1. Once again we found no order effects and thus have excluded this variable from all reported analyses. Target gender and participant gender had significant effects on several of the dependent variables in Experiment 2, but were not of central interest to the study. We report these results in the Supplemental Materials.

3.3. Results

In the manipulation check, participants again rated targets displaying dominance as more powerful ($M = 4.48$, $SE = 0.14$) than targets displaying submissiveness ($M = 2.61$, $SE = 0.14$), $F(1,95) = 93.33$, $p < 0.001$, $\eta_p^2 = 0.50$; 95% CI [0.35, 0.60] (see Supplemental Materials for additional analyses).

Consistent with Experiment 1, participants fixated more often overall on targets displaying submissiveness ($M = 0.98$, $SE = 0.01$) compared to targets displaying dominance ($M = 0.90$, $SE = 0.01$), $F(1,95) = 101.17$, $p < 0.001$, $\eta_p^2 = 0.52$; 95% CI [0.37, 0.62],[3] and spent significantly longer fixating on targets displaying submissiveness

[3] This effect was not driven by the fact that two of the seven dominance-displaying images but none of the submissive-displaying images contained other objects on the screen (e.g., table, extra chairs) that could have reduced the number of fixations on the target. Even when excluding fixations on these objects, the main effect of pose was still highly significant, $F(1,95) = 85.08$, $p < 0.001$, $\eta_p^2 = 0.47$; 95% CI [0.33, 0.58].

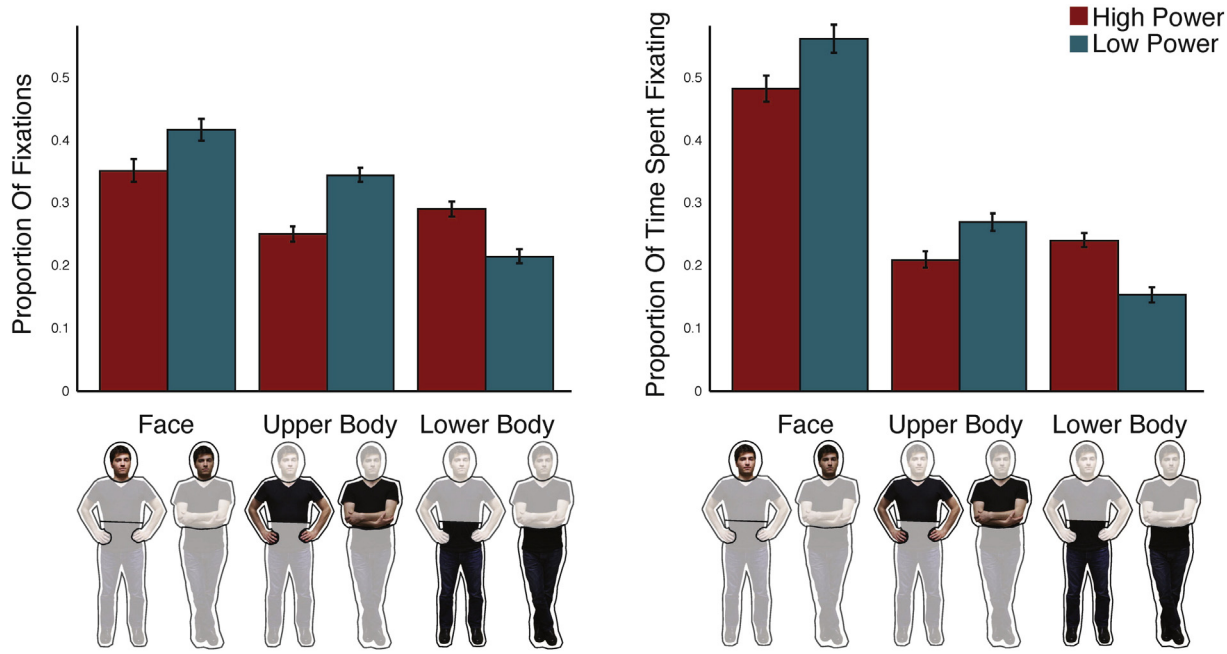

Fig. 4. Proportion of fixations and time spent fixating across each body region (Experiment 2). Error bars indicate ±1 SEM.

($M = 0.99$, $SE = 0.01$) relative to targets displaying dominance ($M = 0.93$, $SE = 0.01$), $F(1,95) = 61.01$, $p < 0.001$, $\eta_p^2 = 0.39$; 95% CI [0.24, 0.51].[4]

Replicating our findings from Experiment 1 and consistent with our hypothesis, participants fixated significantly less often on the upper bodies of targets displaying dominance ($M = 0.25$, $SE = 0.01$) than targets displaying submissiveness ($M = 0.35$, $SE = 0.01$), $F(1,95) = 28.82$, $p < 0.001$, $\eta_p^2 = 0.23$; 95% CI [0.10, 0.36], and fixated for shorter amounts of time on the upper bodies of targets displaying dominance ($M = 0.21$, $SE = 0.01$) than targets displaying submissiveness ($M = 0.27$, $SE = 0.01$), $F(1,95) = 10.05$, $p = 0.002$, $\eta_p^2 = 0.10$; 95% CI [0.01, 0.22]. Further, in line with Experiment 1, participants both fixated more often on the lower body of targets displaying dominance ($M = 0.29$, $SE = 0.01$) than targets displaying submissiveness ($M = 0.22$, $SE = 0.01$), $F(1,95) = 20.25$, $p < 0.001$, $\eta_p^2 = 0.18$; 95% CI [0.06, 0.31], and spent more time fixating on the lower bodies of targets displaying dominance ($M = 0.24$, $SE = 0.01$) than targets displaying submissiveness ($M = 0.15$, $SE = 0.01$), $F(1,95) = 26.14$, $p < 0.001$, $\eta_p^2 = 0.22$; 95% CI [0.09, 0.35].

Participants fixated less often on the faces of targets displaying dominance ($M = 0.35$, $SE = 0.02$) than the faces of targets displaying submissiveness ($M = 0.42$, $SE = 0.02$), $F(1,95) = 6.40$, $p = 0.01$, $\eta_p^2 = 0.06$; 95% CI [0.00, 0.17], and spent less time fixating on the faces of targets displaying dominance ($M = 0.48$, $SE = 0.02$) than targets displaying submissiveness ($M = 0.56$, $SE = 0.02$), $F(1,95) = 7.09$, $p = 0.009$, $\eta_p^2 = 0.07$; 95% CI [0.00, 0.18];[5] (See Fig. 4.)

3.4. Discussion

Experiment 2's findings replicate those from Experiment 1, providing additional evidence that humans avert and lower their gaze from individuals who nonverbally display dominance. Experiment 2 also extends Experiment 1, showing that humans look less often and for shorter durations at the faces of targets displaying dominance when those targets are looking directly toward them.

4. General discussion

Integrating work from the animal literature and the social psychological literature on status, power, and nonverbal communication, we provide strong initial evidence across two experiments that humans, like their nonhuman primate counterparts (de Waal, 1982), avert their gaze from individuals engaging in nonverbal dominance displays. In Experiment 1, we found that individuals avert and lower their gaze from a diverse array of targets engaged in dominance displays. In Experiment 2, we replicated these findings using more standardized stimuli, and demonstrated that humans avert their gaze from the faces of dominance-displaying targets when those targets are looking directly toward them. Although previous work has shown that humans direct more visual attention to targets they know to possess status (Foulsham et al., 2010), here we show that when those targets clearly express dominance nonverbally, humans look away from their faces and upper bodies – perhaps to signal submission and avoid conflict.

Our findings highlight an important distinction between reactions to overt expressions of two distinct types of status: dominance and prestige (e.g. Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013; Henrich & Gil-White, 2001). Prestige "refers to social rank that is granted to individuals who are recognized and respected for their skills, success, or knowledge" (Cheng et al., 2013, p. 105). Dominance refers to social rank that is granted through intimidation or coercion. Although both greater dominance and greater prestige lead observers to pay more visual attention to high-status individuals (Cheng et al., 2013), our findings demonstrate that overt expressions of prestige and dominance have differential effects on visual attention. Whereas overt signals of prestige, such as clothing (DeWall & Maner, 2008; Maner et al.,

[4] This effect remained significant when excluding fixations on the background objects in two of the seven dominance-displaying images, $F(1,95) = 49.61$, $p < 0.001$, $\eta_p^2 = 0.34$; 95% CI [0.19, 0.47].

[5] Given that power had no impact on visual attention to the face in Experiment 1 yet did in Experiment 2, we conducted additional analyses to determine the overall effect across experiments. Specifically, we found a main effect of power on the proportion of fixations on the face, $F(1169) = 6.39$, $p = 0.01$, $\eta_p^2 = 0.04$; 95% CI [0.00 ,0.11], which was not qualified by experiment, $p = 0.50$. Likewise, a main effect of power on the proportion of time fixating on the face was significant, $F(1, 169) = 5.94$, $p = 0.02$, $\eta_p^2 = 0.03$; 95% CI [0.00, 0.10], which again was not qualified by experiment, $p = 0.48$. Taken together, these results suggest that although direct gaze may have made participants even more likely to avert their gaze from the faces of dominant targets (versus submissive targets), direct versus indirect gaze did not fundamentally change the nature of the relationship between pose type and visual attention to the face.

2008) or role (Ratcliff et al., 2011) increase visual attention to a target, we find that an overt signal of dominance, expansive body posture, brings about the opposite effect – gaze aversion.

Our experiments add to previous work on nonverbal "complementarity" (Tiedens & Fragale, 2003), which demonstrates that if an individual displays a dominant, expansive posture, then his or her partner will adopt a submissive, contractive posture in response (Carney et al., 2010; Cuddy et al., 2015). Given that gaze aversion signals submission (Chance, 1967; Dovidio, Ellyson, Keating, Heltman, & Brown, 1988), our finding that participants looked away from dominance-displaying targets could well be construed as a complementary response. Put simply, upon viewing a dominant target, individuals adopt a submissive stance, deferring their gaze and looking away from the target. Conversely, upon viewing a submissive target, individuals display a more dominant response, looking directly toward the target's face and upper body.

Our studies have several limitations that offer fruitful directions for future research. Like much of the research on visual attention to high-status others, we used static images as stimuli. Although we found strong effects in our experiments, it is possible that the effect of dominant postures on visual attention would be weaker or somehow different if our participants had been interacting with a counterpart in person instead of a static image (e.g., Risko et al., 2016). Further, although our stimuli are highly controlled representations of body postures, they do not mimic all of the complex dynamics that may unfold in live interaction. For example, individuals may attend to a dominance-displaying target differently depending on the relative status of the individual and the target. Perhaps individuals who have higher status than a dominance-displaying target are less likely to avert their gaze than individuals who have lower status. Similarly, other individual differences, such as trait submissiveness, could moderate our effects (e.g., Terburg, Hooiveld, Aarts, Kenemans, & van Honk, 2011). Our stimuli also did not allow us to examine how individuals would attend to multiple individuals, each of whom may express varying degrees of nonverbal dominance or submissiveness. When individuals gaze at a group of individuals engaging in a variety of nonverbal displays, it is possible that they avert their gaze away from dominant individuals, and toward submissive individuals. Alternatively, they may simply look away from all people in the group. Future research should explore whether individuals avert their gaze from dominance-displaying counterparts in person, and how situational factors and individual differences may moderate the effects we found here (where contextual information was limited).

Another limitation of our research is that we did not include a "neutral" pose control group, only comparing differences in visual attention to dominant vs. submissive postures. To date, much of the psychological research on nonverbal displays of power (e.g. Carney et al., 2010; Huang, Galinsky, Gruenfeld, & Guillory, 2011; Tiedens & Fragale, 2003) has not included a baseline condition, as it is not theoretically or practically clear what is meant by "no power," especially in the context of nonverbal behavior. The inclusion of a medium power condition could potentially serve as an alternative baseline, however the nonverbal communication literature has not determined what "medium power" would look like nonverbally.

A final limitation of our work is that we cannot be sure of precisely why individuals averted their gaze from the faces and upper bodies of dominance-displaying targets. Gaze has dual functions: eyes both gather information and communicate information to others (e.g., Risko et al., 2016). In our experiments, participants attended less to targets engaged in dominance displays, but attended more to the lower bodies of these targets, as compared with targets displaying submissiveness. This could be interpreted as gaze aversion – a lowering of the gaze to avoid eye contact and signal submission to the target – but attending to the legs of dominance-displaying targets could also allow observers to strategically monitor the actions of those who may pose a threat. Future work should ascertain the extent to which the lowering of gaze is driven by vigilance to threat (i.e., gathering information) vs. the avoidance of eye contact (i.e., communicating information to others).

Overall, our experiments provide strong evidence that, like non-human primates, humans avert their gaze from targets who overtly express nonverbal dominance (compared to those who express submissiveness). In particular, individuals look away from the faces and upper bodies of dominance-displaying others, instead focusing their gaze on their lower bodies or elsewhere completely. It has long been theorized that lowering gaze in response to overt displays of dominance helps to reinforce social hierarchies in non-human primates (e.g. Coss et al., 2002). The present work clearly suggests that humans are not immune to these automatic and socially meaningful behaviors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jesp.2016.05.001.

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