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Picture Power: Gender Versus Body Language in Perceived Status

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Abstract Power hierarchies in interaction are maintained due to a variety of cues including gender and body language and can keep competent individuals from being regarded as high status. The present study primed participants with an image consisting of two components—gender (man or woman) and body pose (dominant or submissive)—and then asked participants to classify written target words as either dominant or submissive. In response to these target words, we measured accuracy (% incorrect) and classification speed (RT), in addition to event-related potentials (ERP), from 23 participants. Although we did not find ERP differences in the predicted N400 component, error rate and RT measures indicated that regardless of the gender of the prime, dominant poses facilitated identification of dominant words. Interestingly, whereas female submissive posing facilitated classification of submissive target words, male submissive posing did not. These results support the idea that women can use counter-stereotypical nonverbal displays, dominant poses, to change how they are initially perceived in terms of power. Interestingly, men may be more limited in the success of their counter-stereotypical, submissive, posing. Potential underlying mechanisms are discussed.

Keywords Gender · Power · Pose · Body language · Dominance

Introduction

Within 1–5 min of three strangers meeting, a power hierarchy has already emerged among them (Fisek and Ofshe 1970). This streamlines interactions; instead of jockeying for high power positions, individuals are slotted into different positions based on their personal

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29 power as perceived by the group. It is well known that there are a number of cues that
30 people use to determine this hierarchy (e.g., gender and nonverbal displays), but it is not
31 clear which variable takes precedence when two or more conflict. For instance, if a white
32 man enacts submissive body language, will he be perceived as powerful (based on his
33 gender and racial group identities) or powerless (based on his individual-specific body
34 language)? The present study investigates which power cue is stronger—gender or body
35 language—in priming power attributions.

36 When status cues compete either, one will have more of an impact or they will cancel
37 each other out. The interplay between rank and gender has been well studied (e.g., Dovidio
38 et al. 1988; Henley 1995), but which takes precedence—gender or body pose—has re-
39 ceived less attention. Gender compared to body language has been researched using only
40 indirect descriptions of a man (Aguinis et al. 1998) and a woman (Aguinis and Henley
41 2001) in separate studies that artificially inflate the importance of nonverbal displays by
42 explicitly drawing participants' attention to them through a written story. To our knowl-
43 edge, ecologically valid visual displays of gender and body pose have not been compared
44 to determine which cue is more meaningful during actual perception. The present study
45 undertakes this endeavor.

46 The Vertical Dimensions

47 Perceptions of who is, or who should be, in charge organize social interactions (Fisek and
48 Ofshe 1970). Relationships of this nature are part of the “vertical dimensions,” which
49 include particular social contexts, such as who emerges as the leader in a group project
50 (Buss 2004; Henley 1995; Maricchiolo et al. 2011), and broad cultural patterns, such as
51 which sub-group receives the most resources (Ho et al. 2012). The vertical dimensions
52 contrast with the “horizontal dimensions,” which encapsulate egalitarian relationships
53 among peers, such as friendships (Hall et al. 2005).

54 A vertical hierarchy can be a manifestation of disparity in dominance, competence,
55 power, or status. Though these concepts differ, they have not always been consistently
56 distinguished in the literature (Carney et al. 2010; Fiske et al. 2006; Foschi 2000; Hall
57 1998). For example, dominance has been defined as behavior seeking to control others
58 through subtle or explicit threats (Hall et al. 2005; Ridgeway 1987) and also as an indi-
59 vidualized personality trait (Carney et al. 2005; Hall et al. 2005; Henley 1995; Ho et al.
60 2012; Mazur et al. 1980). Despite the nuances between dominance, competence, power,
61 and status, all four terms represent the upper hierarchical term in their respective vertical
62 relationships (i.e., dominant is to submissive as competent is to incompetent). Therefore, to
63 account for the inconsistent definitions of specific terms, the present study follows
64 precedence in collapsing them into one conceptual category termed V, referring to the
65 vertical dimensions broadly (Hall et al. 2005; Henley 1995). One's V is based on different
66 types of cues, including gender.

67 Gender

68 Social Role Theory distinguishes between sex, which is biologically determined due to
69 chromosomal, hormonal, and phenotypical differences that are relatively immutable, and
70 gender, which is understood as a socially constructed role (Eagly 1987; Henley 1995). It
71 proposes that inner dispositions are inferred from external behavior; thereby gender roles
72 also encompass internal characteristics and traits (Eagly 1987; Eagly et al. 2000).



73 Role Congruity Theory is an extension of Social Role Theory, and it explains women's
74 continued underrepresentation in leadership positions (Catalyst 2013; Center for American
75 Women and Politics 2013) as a perceived incompatibility between the traits associated
76 with women and those associated with leaders. Research confirms that women are asso-
77 ciated with being communal, while men and political and businesses leaders more gen-
78 erally are associated with being agentic (Cejka and Eagly 1999; Glick and Fiske 1996;
79 Koenig et al. 2011; Powell and Butterfield 1989; Rosenwasser and Dean 1989; Rudman
80 et al. 2012; Sczesny 2003; Sczesny et al. 2006). These trait associations connect women
81 with low V and men with high V. Research also confirms how easily gendered associations
82 can be primed (White et al. 2009). For instance, Banaji and Hardin (1996) primed par-
83 ticipants with gender-related (e.g., doctor) and neutral words and then presented gendered
84 and neutral pronouns. They found that participants formed an expectation for gendered
85 pronouns based on the corresponding gendered primes even when the task did not ex-
86 plicitly ask about gender.

87 Role Congruity Theory helps to explain why women and men occupy different positions
88 on the vertical hierarchies by suggesting that women's ascribed traits are seen as incom-
89 patible with high V positions. Men and women are so frequently associated with high V
90 and low V respectively, that gender itself becomes a heuristic cue for V status. Another cue
91 that can signify V status is body language.

92 Embodied V

93 People with different V status also display different patterns of body language. This
94 overlaps with gender, with men displaying high V body language and women low V body
95 language (Aries 1996; Hall 1990), but also emerges in other V relationships (Hall et al.
96 2005). One key finding is that high V individuals tend to take up more space (Hall et al.
97 2005; Henley 1995). For instance, in Hai, Khairullah and Coulmas's (1982) iconic study,
98 researchers used a naturalistic setting and observed who used the shared armrest on air-
99 planes and found that even when controlling for relative body size, men were 75 % more
100 likely to use the armrest. Similarly, Hall et al. (2005) conducted a meta-analysis sum-
101 marizing studies that examined the actual nonverbal differences between groups based on
102 their V status, defined *not* in terms of gender but rather by rank. They found that across
103 studies, regardless of specific V dimension definitions (i.e., power, dominance, or com-
104 petence) consistent differences emerged in broad bodily posture, with people high in V
105 displaying more openness (keeping limbs open instead of crossed) and expansiveness
106 (taking up more space).

107 The above V differences in body language *production* mirror differences in body lan-
108 guage *perception* as well. Displays of gestural and postural cues high in V, lead to the
109 perception and attribution of high V (Aguinis and Henley 2001; Henley 1995; Maricchiolo
110 et al. 2011; Ridgeway 1987). Perceived differences in nonverbal displays of people along
111 the V dimensions are augmented compared to actual differences. Hall et al. (2005) found
112 that across studies, perceivers connect high V with more bodily openness and expan-
113 siveness, and fewer self-adaptors. Schmid Mast and Hall (2004) presented pictures of two
114 actual professional colleagues interacting, and had one cohort of participants rate each
115 individual's rank in isolation and another cohort do so relative to the pictured individual's
116 partner. By correlating these ratings to coded nonverbal displays, they found that par-
117 ticipants in both cohorts used pictured individuals' nonverbal displays to make V status
118 ratings at remarkably accurate rates, compared to other characteristics inferred from body
119 language [such as personality traits (Gifford and Hine 1994)]. Therefore, not only do



120 people with different V statuses produce distinct nonverbal displays, but also perceivers
121 use that body language to make V attributions.

122 It is clear that the vertical dimensions organize social interaction. Nonverbal displays
123 are one of the ways that individuals high in V, regardless of its source (gender, race, status,
124 etc.), assert and maintain their hierarchal position (Henley 1995). DePaulo (1992) argues
125 that nonverbal displays can serve self-presentational purposes, and under certain conditions,
126 allow people to manipulate how others perceive them. Recent interdisciplinary
127 evidence from neuroscience extends these behavioral findings by indicating the importance
128 of social cues to semantic understanding at very early stages of processing.

129 **Neurological Underpinnings**

130 Early models of communication privileged the semantic meaning of a sentence, based on
131 grammatical rules (syntax) and vocabulary, over pragmatics, which are based on social
132 contexts, including those mediated by V hierarchies (Chomsky 1957). These models
133 proposed that semantic information is processed first, followed by pragmatics. More recent
134 neuroimaging linguistic studies indicate that pragmatic contextual cues are integrated into
135 language processing earlier than previously thought (Leuthold et al. 2012; Tesink et al.
136 2009; van Berkum 2008).

137 One tool that has been applied to many social neuroscience questions because of its high
138 temporal sensitivity is electroencephalogram (EEG) data, which are recorded from the
139 scalp and measure continuous electrical activity in the brain. These data can be segmented
140 to particular time points, such as a given stimulus presentation, and averaged to create
141 event-related potentials (ERPs). Characteristic ERPs have been identified with particular
142 brain processes. A negativity beginning around 300 ms and peaking around 500 ms post-
143 stimulus onset (N400) indexes semantic integration. Violations of semantic congruity (e.g.,
144 “He took a sip from the transmitter) elicit larger N400s (Key et al. 2005; Kutas and
145 Federmeier 2000; Kutas and Hillyard 1980).

146 Van Berkum et al. (2008) created violations based only on subtle social information and
147 still found larger N400s. The sentences themselves reflected perfect semantic congruity but
148 were incongruous with the speaker’s social roles based on vocal cues about his or her
149 gender, class, or age. For instance, in the sentence, “I have a large tattoo on my back,”
150 larger N400s were elicited to the word “tattoo” when the sentence was read in an upper-
151 class accent as opposed to a lower-class accent. The importance of pragmatics to semantic
152 processing has been extended to single word pairs, removing words from any syntactic
153 structure (Bentin et al. 1985). White et al. (2009) primed participants with either “woman”
154 or “man” and then presented participants with a gender-associated target word. They
155 found larger N400s for incongruous pairings.

156 This research elevates the importance of pragmatic information, including gender
157 (White et al. 2009) and body cues (de Gelder 2006; de Gelder et al. 2010; Stekelenburg and
158 de Gelder 2004; van Heijnsbergen et al. 2007), to language processing and communication
159 more broadly. Such socially relevant cues impact basic semantic processing as early as
160 300 ms after word presentation. It also establishes the use of temporally sensitive neuro-
161 science methodologies, such as ERPs, to the study of socially relevant cues through
162 priming paradigms. This is a powerful tool in that it can uncover neural differences even in
163 the absence of differences in behavioral outcomes. Furthermore, when there are comple-
164 mentary behavioral differences, ERPs can give insight into the specific mechanisms (e.g.,
165 specific high-level cognitive processing) underlying those behaviors.



166 **The Present Study**

167 V cues are often confounded. High power nonverbal displays are traditionally associated
168 with men, and low power nonverbal displays with women (Hall 1990). However, these
169 connections are no longer thought to be necessary or absolute (Hall et al. 2005). From the
170 perspective of Social Role Theory (Eagly 1987) it is possible that body language can be
171 used by *both* men and women to change how they are perceived (DePaulo 1992). Which
172 cue is more important—gender of body pose—then becomes an important question both
173 theoretically and practically. Women and men still fill very different roles in society (Eagly
174 1987), with women having difficulty achieving equal representation in high power roles
175 (Catalyst 2013; Center for American Women and Politics 2013). Body language may
176 provide one way to achieve that goal by changing how individual women are perceived.

177 The present study draws on the established association between gender and V status
178 (Eagly and Karau 2002; Henley 1995), and on that between embodied presentations and V
179 status (Schmid Mast and Hall 2004), to understand which cue is more important and
180 whether this differs for men and women. To answer this question, we use behavioral
181 indexes. We also collect ERPs, taking advantage of the relatively recent application of the
182 established N400 component to socially meaningful cues and body language (de Gelder
183 et al. 2010; White et al. 2009), to test for difficulty with semantic processing as one
184 potential causal mechanism. Participants were shown pictures that provided the dual prime
185 of gender and body pose. They were then presented with high V words or low V words and
186 asked to rapidly classify the word as either dominant or submissive. The degree to which
187 the gender and pose information in the primes influenced the participants' classification
188 was measured by their error rates, reaction times (RT), and brain response—larger N400s
189 indicating difficulty with semantic processing caused by incongruity with previous se-
190 mantic context.

191 Using this paradigm, we predict that our findings will conceptually replicate the asso-
192 ciations already established in the literature between: (1) men and high V and women and
193 low V (e.g., Rudman et al. 2012), (2) more open body language and high V and more
194 closed body language and low V (e.g., Hall et al. 2005) and (3) men and high V posing and
195 women and low V posing (e.g., Hall 1998). For example, we predict that men followed by
196 high V words, high V poses followed by high V words, and men in high V poses will all be
197 easier to process than their respective incongruous counterparts (as manifested by fewer
198 errors, quicker RTs, and smaller N400s).

199 Secondly, and critically, this study will then add to the literature by investigating how
200 gender and pose interact. When body pose and gender do not align with stereotypical
201 expectations, we have two-fold predictions. If gender matters more, correctly categorizing
202 target words will be easier (fewer errors, quicker RTs, and smaller N400s) when gender is
203 congruent with the target words regardless of the pose. For example, men in low V and
204 high V poses will equally facilitate identification of high V words. Such a pattern would
205 indicate that participants utilized the gender prime more than the pose prime in forming
206 their expectations and would support the conception that gender roles are prioritized as
207 social organizers (Eagly 1987; van Berkum et al. 2008). If pose matters more, we predict
208 the opposite pattern; that is, men in high V poses will facilitate identification of high V
209 words more than men in low V poses. This would support the conception that individual V
210 displays enacted by the whole body cut through gender stereotypes and provide more
211 socially meaningful information about an individual's V status (de Gelder 2006; DePaulo
212 1992).



213 Method

214 Ethics Statement

215 This experiment was reviewed and approved by the university's Institutional Review
216 Board (IRB). All participants read and signed an informed consent form before the study
217 and a debriefing form afterwards, both of which were also approved by the IRB.

218 Participants

219 Twenty-three undergraduates (17 women, 20 white, all right-handed as self-reported)
220 between the ages of 18 and 21 participated for research course credit or on a volunteer
221 basis. All participants were native English speakers and had normal (or corrected to
222 normal) vision. One participant was discarded from the ERP analysis due to excessive
223 artifacts in brain wave data.

224 Sample size was chosen a priori to be between 20 and 25 participants based on previous
225 work with similar methodologies in the neuroscience (e.g., White et al. 2009) and cognitive
226 traditions (e.g., van den Stock et al. 2007). Power analyses bolstered the suitability of this
227 range. A priori power analyses conducted using the program G-star power (Faul et al.
228 2007) with an effect size of $\eta_p^2 = 0.26^1$ —determined to be a large effect size and thus
229 theoretically significant (Murphy et al. 2009)—indicated that 16 participants were needed
230 to reach a power of 0.95.

231 Materials

232 The video stimuli were comprised of a prime image with two components, pose (high V or
233 low V) and gender (male or female), followed by a target word (high V or low V). The 8 V
234 poses were enacted by 6 individuals, leading to 48 distinct images. Each image was then
235 paired with either a high V or low V word, generating 96 distinct trials. The words were
236 cycled such that a given word was not paired more than once with a given pose or more
237 than once with a given individual, thereby participants could not develop any association
238 between a particular pose and a particular word, or a particular individual and a particular
239 word.

240 A trial consisted of 200 ms of a gray screen with a white '+' focus point, 100 ms of a
241 blank gray screen, 200 ms of a gray screen with the prime image (Hinzman and Kelly
242 2013; Meeren et al. 2005; van den Stock et al. 2007), 100 ms of a blank gray screen,
243 200 ms of a gray screen with the target word written in white, and then 1100 ms of a blank
244 gray screen (White et al. 2009). Inter-trial stimulus interval varied from 1500 to 2000 ms.
245 All videos were made using iMovie and ERP recording time locked to target word onset
246 using an in-house tagging program called TagMovies.

247 *Pose Prime*

248 For the pose component of the prime, five high V and five corresponding low V poses were
249 extracted and generated from the nonverbal literature (Buss 2004; Carli et al. 1995; Carney
250 et al. 2010; de Lemus et al. 2012; Hall et al. 2005; Henley 1995; Ridgeway 1987; Tiedens
251 and Fragale 2003; Yang 2010). High V poses displayed more bodily openness, more bodily

1FL01 ¹ This effect size was computed from the alternate statistic $f^2 = 0.35$ in the program G-star power.



252 expansiveness, and fewer self-adaptors. These features were chosen for their consistent
253 representation in actual and perceived differences in body language along the V dimension
254 (Hall et al. 2005) and for their applicability to static, facial-expression-controlled repre-
255 sentations. In a preliminary study, four participants (not included in the present sample)
256 rated these poses enacted by both men and women on a seven-point Likert scale. Order
257 effects were controlled for by varying order of pose type presentation and gender pre-
258 sentation. One low V standing pose was rated as relatively higher in V. Though it was still
259 viewed as more submissive than its high V counterpart, it was rated higher in V than
260 neutral.² Therefore, this pose and its high V counterpart were discarded, leaving a total of
261 eight poses (See Fig. 1 for low V poses and Fig. 2 for high V poses).

262 *Gender Prime*

263 The gender component of the prime was provided by the gender of the model pictured,
264 which aligned with their sex according to typical patterns to ensure that gender was a
265 meaningful prime. The stimuli were all white and heterosexual-identifying, as race and
266 sexual orientation intersect with V attributions in complex ways beyond the scope of the
267 present study (Lyons et al. 2014; Moore and Porter 1988; Parker and Ogilvie 1996). All
268 models wore black t-shirts and dark colored jeans with no jewelry to standardize the
269 formality of dress, which has also been linked to V status attributions (Schmid Mast and
270 Hall 2004). Six distinct models provided the stimuli and two additional models were used
271 for practice trials only. Though this introduced variability, it ensured that the findings
272 would be generalizable beyond a given individual and prevented participants from growing
273 accustomed to a given model as an exception who violates gender norms (van Berkum
274 et al. 2008).

275 Real models were used, as opposed to computer-generated images, to ensure greater
276 generalizability to actual human interactions. One limitation of this is that body size varied
277 according to typical sexed patterns: the men tended to be larger. The pictures were cropped
278 relative to the body, rather than having larger bodies fill the frame more. However, this
279 meant that the men's pictures tended to be larger. Relative body size in the images was
280 controlled for by matching the size of the chair in all seated poses across individuals. For
281 the standing pose, which did not include a chair, the size of the face was matched to that
282 individual's face in a seated poses to ensure consistency. Therefore, visual body size
283 differences were only representative of individual variability that reflected typical gender
284 differences. Models' heights were representative of the averages for white men and women
285 (Visscher 2008; see Table 1).

286 Since facial expression can connote V status (Hess et al. 2004), facial expression was
287 controlled for. The face of individuals in a neutral pose was digitally transposed onto all
288 poses for that individual using Photoshop. Therefore facial expression did not differ across
289 pose conditions. Since research shows that when facial expression and body language
290 conflict, perception is biased towards the body, we can be confident that the incongruous
291 neutral face did not override the V body cues (Meeren et al. 2005; van den Stock et al.
292 2007); though it is important to note that this research concerns emotional body expression
293 rather than V body expression. If there were any gendered V differences in resting facial
294 expression because of gender differences in facial composition and micro-facial expression

2FL01 ² With one being low V, four being neutral, and seven being high V, low V poses were rated respectively:
2FL02 2.38, 1.50, 2.50, 4.38, and 3.38. The italicized score is what caused that pose and its high V counterpart to be
2FL03 discarded. High V poses were rated respectively: 5.13, 5.38, 6.50, 5.88, 6.25.



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◀ **Fig. 1** Each low V pose enacted by a sample of women compared to men is here depicted. Notice that the men's pictures tend to be larger; pictures were scaled relative to body size and this difference reflects the average difference in men and women's height

295 (Hess et al. 2004; Keating 2011), rather than being a confounding variable, this would
296 simply be an additional component of typical gender presentation.

297 Finally, attractiveness data was collected to ensure that any effect of the gender prime
298 was not actually an attractiveness effect (Poling 1978). Following the experimental task,
299 participants rated the models in neutral poses on attractiveness using a seven-point Likert-
300 type scale; 13 participants received a scale where seven represented "most attractive," and
301 10 participants received an inverted scale. Order of model presentation was randomized
302 using a random numbers generator in the statistical package R, and was distinct for each
303 participant. Results are discussed below.

304 *Target Words*

305 Target words were extracted from the published operational definitions of the vertical
306 dimension (denoted as dominance, competence, power, or high status) in the relevant
307 literature (Carney et al. 2010; Fiske et al. 2006; Hall et al. 2005; Ridgeway 1987) and
308 converted into their adjective forms. In a preliminary study, 31 unique participants rated 35
309 words on their association with dominance and submissiveness using a seven-point Likert-
310 type scale with seven representing "dominant" for half of the words, and the inverse for
311 the other half. The eight high V and eight low V words that were most consistently rated
312 according to expectations were used for the target word stimuli (see Table 2 for words and
313 ratings).

314 **Procedure**

315 Participants came into the lab and were brought into a soundproofed room where they sat
316 0.5 m from a computer monitor. First, participants were fitted with a 128-electrode Geo-
317 desic ERP net.³ Next, the experimenter explained that they would see an image flashed on
318 the screen followed by a word. The experimenter explained that the task was to identify the
319 target word as either typically associated with dominance or with submissiveness using a
320 hand-held keypad with one button labeled "DOM" for dominance and one labeled "SUB"
321 for submissiveness. Participants were asked to answer according to their intuitive response,
322 as they only had a couple seconds to respond.

323 A computer recorded their responses and RTs. Participants were instructed that though
324 their task only concerned the word, they should still attend to the image. Superficial
325 compliance was monitored through video surveillance during the task. Because this study

3FL01 ³ The EEG was sampled at 250 Hz using a band-pass filter of 0.1–30 Hz, and impedances were kept below
3FL02 40 k Ω (the Geonet system uses high-impedance amplifiers). The ERPs were vertex referenced for recording
3FL03 and linked-mastoid referenced for analysis and presentation. Following re-referencing, the brain waves were
3FL04 baseline corrected to a 100-ms prestimulus window. Eye artifacts during data collection were monitored
3FL05 with four EOG electrodes, with voltage shifts above 70 μ V marked as bad (for more on the EOG algorithm,
3FL06 see Gratton et al. 1983; Miller et al. 1988). Non-EOG channels were marked as bad if there were shifts
3FL07 within the electrode of greater than 200 μ V for any single trial. If over 20 % of the channels were bad for a
3FL08 trial, the whole trial was rejected. Considering all of the participants, 8.31 % ($SD = 6.79$ %) of the trials
3FL09 were rejected; after removing one participant for excessive artifacts (26.34 %), 7.49 % ($SD = 5.67$ %) of
3FL10 the trials were rejected.



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◀ **Fig. 2** Each high V pose enacted by a sample of men compared to women is here depicted. Again the men's pictures tend to be larger; pictures were scaled relative to body size and this difference reflects the average difference in men and women's height

Table 1 Demographic information and attractiveness rating for individual person primes

Prime person ID	Sex	Hair color	Height (cm)	Attractiveness (<i>SD</i>)
SL	M	Brunette	177.8	4.00 (0.90)
JL	M	Brunette	182.9	4.61 (0.99)
AF	M	Blond	172.7	3.22 (1.23)
Mean for all male primes			177.8	3.94 (0.66)
JG	F	Brunette	157.5	4.26 (1.21)
LB	F	Brunette	160.0	3.61 (0.89)
HS	F	Blond	172.7	4.74 (0.86)
Mean for all female primes			163.4	4.20 (0.74)

^a Mean height for Caucasian males is 178.0 cm (Visscher 2008)

^b Mean height for Caucasian females is 165.0 cm (Visscher 2008)

Table 2 Target words with V ratings from preliminary study

High V words	Mean (<i>SD</i>)	Low V words	Mean (<i>SD</i>)
Dominant	1.03 (0.18)	Submissive	6.77 (0.18)
Powerful	1.03 (0.57)	Powerless	6.45 (0.68)
Controlling	1.03 (1.44)	Passive	6.26 (0.96)
Coercive	1.03 (1.18)	Dependent	6.03 (1.25)
Respected	1.03 (1.17)	Compliant	6.00 (1.03)
Skilled	2.84 (0.78)	Inept	5.65 (1.05)
Active	2.90 (0.83)	Incompetent	5.42 (1.15)
Knowledgeable	2.94 (0.81)	Naïve	5.39 (0.88)
Grand mean	2.22 (1.15)	Grand mean	6.02 (1.07)

^a All scores are reported with 1 being dominant and 7 being submissive

326 investigates which component of the prime takes precedence (gender or pose), participants
 327 were not asked to identify congruency between the word and one of the components of the
 328 prime (cf. White et al. 2009), as this would artificially inflate the importance of one of the
 329 components. Participants were instructed to remain still throughout and to time their
 330 blinking to avoid artifact interference. The 96 trials were randomized and repeated in four
 331 blocks, constituting 384 total trials plus eight initial practice trials. The trials took about
 332 25–30 min to complete, including breaks designed to combat fatigue at approximately
 333 8-min intervals. Finally, participants were brought into a separate room and asked to rate
 334 stimuli in neutral poses on their attractiveness. In total, the experiment took 45–60 min to
 335 complete.

336 Analysis

337 The behavioral data were analyzed with a 2 (gender prime: men or women) × 2 (pose
 338 prime: high V or low V) × 2 (target word type: high V or low V) repeated measures



339 ANOVA with error rate and RTs as the dependent measures. The effect of participant sex
340 is not a main focus of this study; however, including it as a factor in both error rate and RT
341 analyses did not dramatically change the results nor reveal any additional significant
342 effects (though only six men participated). Sphericity was adjusted for using the Green-
343 house–Geisser correction, which, though conservative, is appropriate for repeated mea-
344 sures designs. RTs were analyzed for correct answers only, and any responses that
345 exceeded two standard deviations in either direction were eliminated. Noting that pro-
346 portions tend to display platykurtosis, the error rate data was transformed using the arcsine
347 of the square root transformation for analysis in order to meet the assumptions of a
348 parametric test (Sokal and Rohlf 2012). Orthogonal paired-sample t-tests were conducted
349 to understand the effect of attractiveness ratings and on the error rates and RTs to conduct
350 contrasts.

351 The ERP data were analyzed with a 2 (gender prime: male or female) \times 2 (pose prime:
352 high V or low V) \times 2 (target word: high v or low V) \times 2 (hemisphere: left or right) \times 5
353 (electrode region: central, frontal, occipital, parietal, or temporal⁴) repeated measures
354 ANOVA. The baseline (0–100 ms) for all 80 conditions was averaged and subtracted from
355 the averaged time window of interest (i.e. 300–500 ms) to generate a single averaged
356 amplitude index.

357 Results

358 Behavioral Results

359 We predicted that if participants attended to gender more than pose, pose incongruity with
360 target word would have little effect on all measures. However, if they attended to pose
361 more, pose incongruity would have a large impact. We also expected to conceptually
362 replicate established associations between gender and pose, pose and V words, and gender
363 and V words.

364 Preliminary Analyses

365 Since attractiveness can affect V attribution (Anderson et al. 2001), it was necessary to
366 ensure that attractiveness was not confounded with the gender prime manipulation. A
367 paired-sample t test did not reveal any significant difference in attractiveness ratings for
368 male primes ($M = 3.94$, $SD = 0.66$) and female primes ($M = 4.20$, $SD = 0.74$),
369 $t(22) = 1.41$, $p = .173$. Moreover, the error rate difference scores for each participant
370 between male and female primes were not significantly correlated with the attractiveness
371 rating difference scores between male and female primes, $r(21) = 0.26$, $p = .234$. For
372 RTs, there was similarly no correlation between RT difference scores and attractiveness
373 rating difference scores concerning the gender prime, $r(21) = 0.27$, $p = .206$. This indi-
374 cates that it does not appear that any of the below gender effects are confounded by an
375 attractiveness halo effect (Anderson et al. 2001; Landy and Sigall 1974).

376 Concerning the pose manipulation, we predicted that there would be an interaction
377 between pose and target word, collapsing across gender, for both error rates and RTs. The
378 ANOVA on error rates revealed an interaction between pose and target word, $F(1,$

4FL01 ⁴ The 128 electrodes were broken up into five clusters of channels that corresponded roughly to basic
4FL02 anatomical structures of the brain (Kelly et al. 2004).



Author Proof

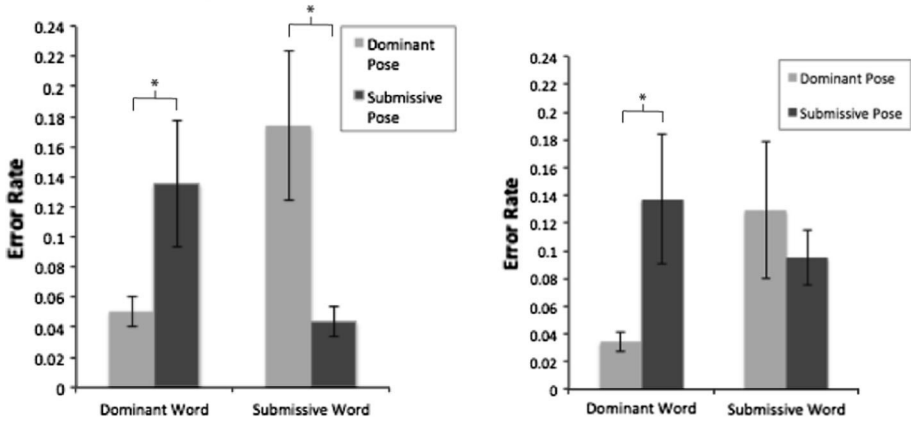


Fig. 3 The effect of pose prime and word type on untransformed mean error rates (SE) for female primes (left graph) and male primes (right graph), * $p < .05$

22) = 6.38, $p = .019$, $\eta_p^2 = 0.23$; there were fewer errors in identifying high V words following high V poses ($M = 0.04$, $SD = 0.04$) compared to low V poses ($M = 0.14$, $SD = 0.21$), $t(22) = -3.06$, $p = .006$, $d = 1.28$, and marginally significantly fewer errors identifying low V words following low V poses ($M = 0.07$, $SD = 0.08$) compared to high V poses ($M = 0.15$, $SD = 0.23$), $t(22) = 1.97$, $p = .061$, $d = 0.82$. Similarly the ANOVA on RTs revealed a significant interaction between pose and target word, $F(1, 22) = 7.26$, $p = 0.013$, $\eta_p^2 = 0.25$. There were quicker RTs for identifying high V words following high V poses ($M = 712.98$, $SD = 121.85$) compared to following low V poses ($M = 740.41$, $SD = 127.70$), $t(22) = -2.91$, $p = .008$, $d = -1.21$, and inversely, for identifying low V words following low V poses ($M = 751.27$, $SD = 115.41$) compared to following high V poses ($M = 779.63$, $SD = 140.62$), $t(22) = 2.16$, $p = .042$, $d = 0.90$. These findings can be conceptualized as a successful pose manipulation check. However both were qualified by statistically significant higher order effects discussed in detail below.

393 Gender Versus Pose

394 Concerning error rates, the ANOVA revealed a significant interaction between gender,
 395 pose, and target word, $F(1, 22) = 8.60$, $p = .008$, $\eta_p^2 = 0.28$, observed power = 0.80 (see
 396 **AQ3** Fig. 3). For female primes, congruent pose-target word pairings elicited fewer errors than
 397 incongruous pairings for both high V and low V pose congruities. Specifically, female
 398 primes followed by high V words led to fewer errors when the prime included a high V
 399 pose ($M = 0.05$, $SD = 0.05$)⁵ compared to a low V pose ($M = 0.14$, $SD = 0.20$),
 400 $t(22) = -2.86$, $p = .009$, $d = -1.19$, and female primes followed by low V words led to
 401 fewer errors when the prime included a low V pose ($M = 0.04$, $SD = 0.05$) compared to a
 402 high V pose ($M = 0.17$, $SD = 0.24$), $t(22) = 3.52$, $p = .002$, $d = 1.47$ (see Fig. 3, left

5FL01 ⁵ All reported error rate means and standard deviations are the untransformed values. Analyses were
 5FL02 conducted on transformed values, according to the arcsine of the square root function, as is appropriate for
 5FL03 proportions (Sokal and Rohlf 2012).

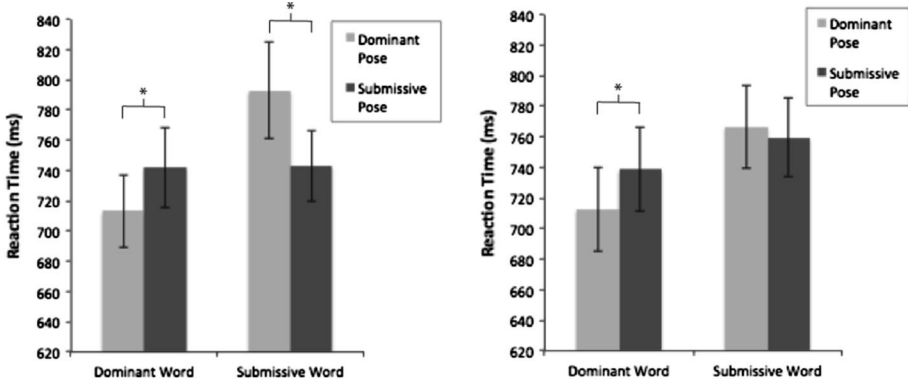


Fig. 4 The effect of pose prime and word type on mean RTs (SE) for female primes (left graph) and male primes (right graph), * $p < .05$

403 graph). Thus, considering both high V and low V words female posing significantly impacted word identification.
 404

405 In contrast, a different pattern of results emerged for male primes. As with female
 406 primes, male primes followed by high V words led to fewer errors when the prime included
 407 a high V pose ($M = 0.03$, $SD = 0.04$) compared to a low V pose ($M = 0.14$, $SD = 0.22$),
 408 $t(3,22) = -3.09$, $p = .005$, $d = -1.29$. However, high V ($M = 0.13$, $SD = 0.23$) and low
 409 V ($M = 0.10$, $SD = 0.09$) poses did not make a statistical difference when male primes
 410 preceded low V words, $t(22) = 0.30$, $p = .767$, $d = 0.30$ (see Fig. 3, right graph). In line
 411 with the prediction that pose matters, pose had a large impact overall, above and beyond
 412 gender, except for male low V posing. Though it was in the expected direction, male low V
 413 posing did not lead to statistically fewer errors concerning low V words indicating it was
 414 particularly difficult to associate men with low V regardless of pose.

415 Examination of RTs reveals an overall complementary pattern, indicating that there was not
 416 a speed-accuracy trade off. The ANOVA again revealed an interaction between gender, pose,
 417 and target word, $F(1, 22) = 4.27$, $p = .051$, $\eta_p^2 = 0.16$, observed power = 0.51 (see Fig. 4).
 418 For female primes, congruent pose-target word pairings elicited quicker RTs than incongruous
 419 pairings for both high V and low V congruities. Specifically, female primes followed by high V
 420 words led to quicker RTs when the prime included a high V pose ($M = 713.18$, $SD = 24.00$)
 421 compared to a low V pose ($M = 742.13$, $SD = 26.47$), $t(22) = -2.45$, $p = .023$, $d = -1.02$,
 422 and when followed by low V words, female primes led to quicker RT when the prime included a
 423 low V pose ($M = 743.20$, $SD = 23.38$) compared to a high V pose ($M = 792.76$,
 424 $SD = 32.01$), $t(22) = 3.74$, $p = .001$, $d = 1.56$ (see Fig. 4, left graph).

425 As with error rates, male primes elicited a different pattern. Male primes followed by
 426 high V words led to quicker RTs when the prime included a high V pose ($M = 712.78$,
 427 $SD = 27.50$) compared to a low V pose ($M = 738.69$, $SD = 27.40$), $t(22) = -2.52$,
 428 $p = 0.019$, $d = -1.05$. However, low V pose ($M = 759.35$, $SD = 25.95$) and high V pose
 429 ($M = 766.51$, $SD = 27.10$) did not make a statistical difference when male primes pre-
 430 ceeded low V words, $t(22) = 0.44$, $p = .667$, $d = 0.18$ (see Fig. 4, right graph). Again, in
 431 line with the prediction that pose matter, pose had a large impact on RTs with the exception
 432 of men in low V poses. Though again in the expected direction, male low V posing did not
 433 significantly facilitate identification of low V words indicating a particular difficulty as-
 434 sociating men with low V regardless of pose.

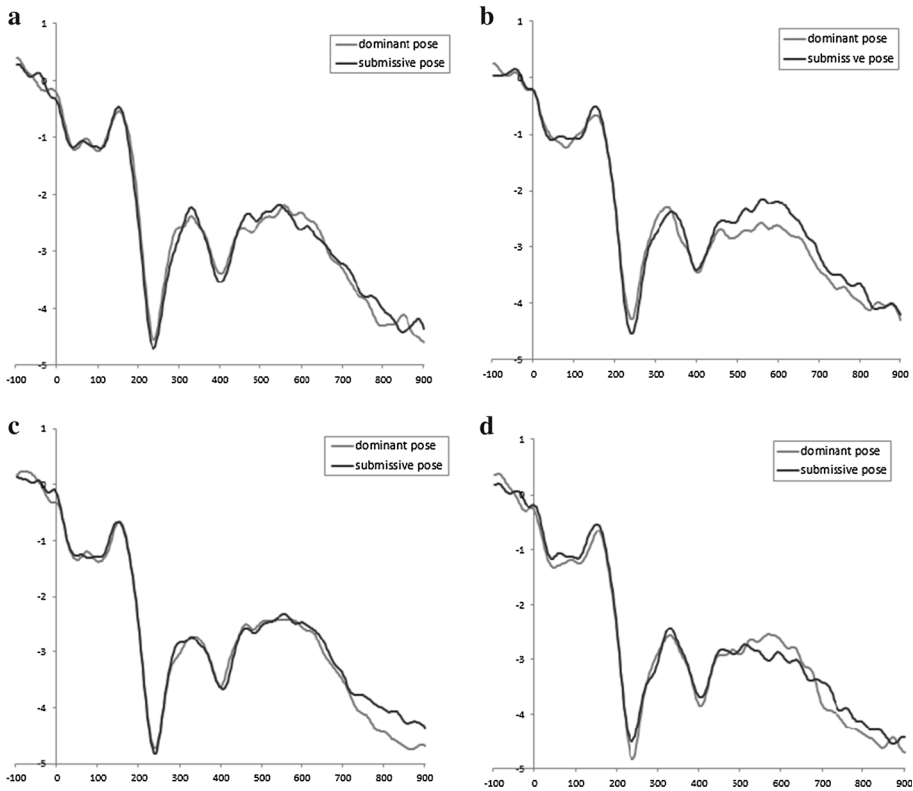


Fig. 5 The null effect of **a** female pose when followed by dominant words, **b** female pose followed when by submissive words, **c** male pose when followed by dominant words, and **d** male pose when followed by submissive words on N400 amplitude differences in the parietal region [selected as exemplar based on van Berkum et al. (2008) and Key et al. (2005)]. Negative is down

435 ERP Results

436 The ANOVA did not reveal a main effect of gender or pose, or an interaction between
437 gender prime, pose prime, or target word for the N400 component at time window
438 300–500 ms, or time window 350–450 ms (Kutas and Hillyard 1984; White et al. 2009)
439 (see Fig. 5). Since the relatively different RTs for target word type, low V words were
440 processed more slowly, could be adding additional variability to the brainwaves, analyses
441 were run considering high V and low V words separately, but there were still no significant
442 N400 differences.

443 Discussion

444 Predictions Revisited

445 First, we did not find evidence for the predicted N400 differences based on prime con-
446 dition. This is somewhat puzzling considering that behavioral effects should arise from



447 neurological differences.⁶ It could be that the task did not adequately require participants to
448 attend to the prime image because it did not require participants to identify if the target
449 word was congruent or incongruent with the prime (cf. White et al. 2009). Although the
450 N400 component can be elicited in cases where the prime is not explicitly linked to the
451 task, this does create a more muted response (Key et al. 2005; Kutas and Federmeier 2011).
452 In the present study, this may explain why the effect does not emerge in the ERP com-
453 ponent but does emerge in the error rates and RTs. An alternative and more theoretically
454 interesting possibility is that the N400 amplitude did not differ according to condition
455 because the subtle pragmatic cues provided by the prime image did not change how the
456 words were processed for meaning. The subsequent behavioral RT and error rate differ-
457 ences may be driven by different cognitive processes besides semantic processing. How-
458 ever, caution should be used in accepting this latter conclusion as it is based on a *lack* of
459 difference in N400 amplitude, which is difficult to demonstrate conclusively.

460 Secondly, there was evidence in the error rate and RT measures that replicated the
461 associations already established in the literature between men and high V posing and
462 women and low V posing (e.g., Hall 1998) and between more open body posing and high V
463 words and more closed body posing and low V words (e.g., Hall et al. 2005). There was
464 less support for the associations between men and high V words and women and low V
465 words (cf. Rudman et al. 2012), seemingly because pose had such a large impact.

466 Finally, this study gives novel insight into the interplay between visual gender and pose
467 cues (cf. Aguinis and Henley 2001; Aguinis et al. 1998) in affecting V attributions. It
468 appears that, overall, pose was more important. For female primes, both high V and low V
469 words were facilitated by congruous posing. For male primes, congruous posing facilitated
470 high V words but pose had no impact on low V words. Female primes were more flexibly
471 associated with V words, and target word identifications tracked pose type, while male
472 primes were rigidly *disassociated* with low V words, such that even male primes in low V
473 poses did not facilitate low V words.

474 To our knowledge, the only previous work that considered gender versus pose also
475 found a greater impact of women's than men's body language on V perceptions. Focusing
476 just on men, Aguinis et al. (1998) used vignettes that described a man using various
477 descriptions of his body language—eye contact, facial expression, and postures—and
478 found that there was no effect of posture when participants rated him on his V. In contrast,
479 Aguinis and Henley (2001) replicated this study using vignettes about a woman instead,
480 and then found an effect of body language. Though these studies point to a similar con-
481 clusion as the present study, they are limited in two key ways.

482 First, the gender comparison was made across studies. Secondly, the studies artificially
483 focused participant attention on nonverbal displays by describing body language in writing.
484 Though this vignette paradigm can research *beliefs* about nonverbal displays, it does not
485 necessarily address actual *perception*. Research indicates that beliefs about nonverbal
486 displays cannot be directly translated to perceived differences (Carney et al. 2005; Hall
487 et al. 2005). The present study used visual poses of actual nonverbal differences to test the
488 effect of perceived differences on V attributions without artificially drawing participant
489 attention to the poses themselves, thereby more closely replicating real-life interactions. By
490 doing so, it extends the effect of imagined women's but not imagined men's broad postural
491 cues on V attributions (Aguinis et al. 1998; Aguinis and Henley 2001) to actual perceptions
492 of postural cues. Crucially, the present study also found, more precisely, that men's V

6FL01 ⁶ It is not unprecedented to discover behavioral effects but not the expected N400 effect. See Brown and
6FL02 Hagoort (1993) for an example and Holcomb et al. (2005) for a more nuanced interpretation.



493 posing actually *does* impact high V attributions; it is only when considering low V attri-
494 butions that pose no longer had an impact.

495 What may account for this interesting difference between perceptions of men and
496 women's posing when it comes to low V words? One possibility is that participants had
497 difficulty associating men with low V because, for male primes, they only attended to
498 gender and ignored pose. However, if this were true men in low V poses should have
499 facilitated identification of high V words equally as well as men in high V poses did, which
500 was not the case. Men in low V poses did not facilitate high V, indicating that male posing
501 was attended to and had some impact. Therefore, we can reject the explanation that
502 concerning men, participants only pay attention to gender.

503 Another related explanation is that though pose was attended to, men are so *disasso-*
504 *ciated* with low V concepts that participants found it difficult to associate men in either
505 pose type with low V. This indicates that when men were followed by low V words, there
506 were similar cognitive processes underlying the slow RTs and high error rates for both high
507 V and low V poses. In both conditions, low V words simply jarred with the male image
508 prime. This explanation, though tenable, is less satisfying because participants' viewed the
509 prime image *before* knowing if the target word would be high V or low V.

510 An alternative explanation is that men in high V poses and men in low V poses elicited
511 different cognitive processes. Men in high V poses caused spreading activation in high V
512 constructs, leading to the observed lack of facilitation of low V words. While men in low V
513 poses did not cause spreading activation of high V constructs, as demonstrated by the lack
514 of facilitation of high V words, or seemingly of low V constructs, as demonstrated by the
515 lack of facilitation of low V words. Therefore though men in high V poses activated high
516 V. Men in low V poses caused confusion. Though the observed results for men in high V
517 poses and low V poses followed by low V words were not statistically different, they could
518 be caused by these different underlying cognitions.

519 There is evidence that men's gender performance is more strictly controlled than
520 women's (Pleck 1995), which may explain why men's counter-stereotypical posing may
521 have caused confusion while women's did not. We know that men are associated with high
522 V posing and women with low V posing (Aries 1996; Hall 1990). It could be for men that
523 this association is more binding than for women. Therefore, it is possible that initially, men
524 in low V poses looked strange to participants because they were not accustomed to seeing
525 men in anything but high V poses. Women, on the other hand, may be able to perform a
526 variety of behaviors, including counter-stereotypical high V poses, while still being fully
527 accepted as women (Pleck 1995). Therefore, women's high V posing was *not* flagged as
528 less expected which allowed it to prime the associated words.

529 Empirically, developmental studies concerning "tomboys", masculine girls, compared
530 to "sissys", feminine boys, confirms the greater acceptable variation given to girls' gender
531 performance (Hemmer and Kleiber 1981; Hilgenkamp and Livingston 2002). The results
532 from the present study also seem to point to this greater fluidity for adult women. Mas-
533 culinity theorists propose that since traditional constructions of gender value masculinity,
534 masculinity is rewarded when enacted by both men and women, while femininity is not
535 (Levant and Pollack 1995). Men are more strictly regulated than women for gender-role
536 violations (Pleck 1995). Indeed, data surrounding self-concept and self-esteem confirm that
537 men suffer greater psychological effects from violating gender roles (O'Neil et al. 1995).
538 The present study implicates social perceptions as one mechanism by which this stricter
539 standard for men is maintained. Put simply, men in low V poses look strange, but women
540 in high V poses are okay.



541 Regardless of specific explanation for the findings, the present study also adds support
542 to the possibility that women, more than men, can use counter-stereotypical nonverbal
543 behaviors to subvert wrongful V attributions based on gender stereotypes. DePaulo (1992)
544 confirms that in certain circumstances, nonverbal behavior can be strategically deployed to
545 meet self-presentational needs. Nonverbal behaviors that are well-suited to impression
546 management manipulation include those under conscious control that are accessible to the
547 individual such as broad postural changes involving large muscles groups. This describes
548 the nonverbal displays used in the present study, which speaks to the potential to generalize
549 the findings of the present study to real-life scenarios.

550 Future Directions

551 The present study used young, white, heterosexual-identifying models as primes in order to
552 isolate only two power cues—gender and pose—rather than considering the additional
553 complexity of other cues such as race or sexuality. Future studies could turn their attention
554 to which cue is more important, gender or pose, considering different groups.

555 Additionally, to achieve leadership in real world situations, research indicates that a
556 combination of high V and low V cues is particularly useful (i.e., competence *and* warmth)
557 (Keating 2011). High V women are not always liked (Henley 1995; Eagly and Karau
558 2002). Koenig et al. (2011) found that over time leadership traits are becoming increas-
559 ingly androgynous due to an inclusion of more feminine traits, not an exclusion of high V
560 typically masculine traits. Therefore, it may still benefit women and men seeking lead-
561 ership positions to be perceived as high in V, though perhaps not exclusively. Future
562 research could test these questions directly by using more explicit behavioral measure to
563 consider participants' intentional actions. For instance, rather than having participants
564 rapidly identify high V and low V words following primes, they could be given images and
565 asked to indicate on a scale how much the individual displays the trait in question. The
566 drawback of this approach is that it may lead participants to over-compensate to appear
567 politically correct or because they hold men and women to different standards for what
568 counts as high V (Biernat 2009). To avoid this problem, research could use more subtle
569 though still explicit manipulations such as requiring that participants make choices mod-
570 eling hiring decisions where only the gender and body language of candidates are
571 manipulated.

572 Conclusion

573 The associations between men, dominant words, and dominant posing remains strong, as
574 does the associations between women, submissive words, and submissive posing. How-
575 ever, women's counter-stereotypical nonverbal performance appears to have a greater
576 impact. When pitting gender and pose together, for women, pose is a powerful predictor of
577 participants' expectations of either dominance or submissiveness. Therefore for women,
578 pose appears to be one way to counteract faulty status cues, such as gender stereotypes.
579 Despite the removal of formal barriers, women are still underrepresented as leaders. This is
580 a societal loss, since high status positions are not filled from the most balanced pool. Body
581 language presents one way to subvert existing implicit barriers. Importantly, self-presen-
582 tational manipulation via counter-stereotypical body posing appears to be an option pri-
583 marily for women. The present study adds insight into the *different*, not necessarily



584 parallel, pressures on men and women according to their respective gender performance.
585 Men, though privileged, may have less flexibility in how they can use counter-stereotypical
586 nonverbal displays to demonstrate their relative positions of power.

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591 **Conflict of interest** The authors declare that they have no conflict of interest.

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