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Dressed to Kill?

Visible Markers of Coalitional Affiliation Enhance Conceptualized Formidability

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26

Abstract

27 Displaying markers of coalitional affiliation is a common feature of contemporary life. In
28 situations in which interaction with members of rival coalitions is likely, signaling coalitional
29 affiliation may simultaneously constitute an implicit challenge to opponents and an objective
30 commitment device, binding signalers to their coalitions. Individuals who invite conflict, and
31 who cannot readily back out of conflict, constitute a greater threat than those who avoid conflict
32 and preserve the option of feigning neutrality. As a consequence, the former should be viewed
33 as more formidable than the latter. Recent research indicates that relative formidability is
34 summarized using the envisioned physical size and strength of a potential antagonist. Thus,
35 individuals who display markers of coalitional affiliation should be conceptualized as more
36 physically imposing than those who do not. We tested this prediction in two experiments. In
37 Study 1, conducted with U.S. university students, participants inspected images of sports fans'
38 faces. In Study 2, conducted with U.S. Mechanical Turk workers, participants read vignettes
39 depicting political partisans. In both studies, participants estimated the physical formidability of
40 the target individuals and reported their own ability to defend themselves; in Study 2,
41 participants estimated the target's aggressiveness. Consonant with predictions, targets depicted
42 as signaling coalitional affiliation in situations of potential conflict were envisioned to be more
43 physically formidable and more aggressive than were those not depicted as signaling thusly.
44 Underscoring that the calculations at issue concern the possibility of violent conflict,
45 participants' estimates of the protagonist's features were inversely correlated with their ability to
46 defend themselves.

47 Keywords: coalitions; signaling; formidability; violence

48 **Introduction**

49 Intergroup conflict is an important determinant of the formation and maintenance of
50 coalitions, as individuals whose interests and affiliations might otherwise diverge often come
51 together in opposition to the members of a rival coalition (Kurzban & Neuberg, 2005). In
52 contexts such as warfare and political contests, coalitions form in pursuit or defense of an
53 external incentive that can be shared among the members of the winning coalition. However,
54 humans also avidly form coalitions merely for the sake of contests themselves, a pattern that
55 plausibly reflects the role of coalitional behavior as a determinant of fitness in both nonhuman
56 primates (Silk, 2007) and extant small-scale societies (e.g., von Rueden, Gurven, & Kaplan,
57 2011), and thus its likely centrality in human evolution (Bowles, 2009). Sports teams are
58 prototypic in this regard, and the enthusiasm with which fans of professional teams align
59 themselves into a higher-order team can plausibly be understood as reflecting the elementary
60 appeal of coalition membership (Fessler & Haley, 2003; Winegard & Deaner, 2010; see review
61 in Hirt & Clarkson, 2011). At the same time, similarly reflecting the deep history of the
62 importance of coalitions, people are exquisitely attuned to tracking markers of coalitional
63 affiliation (Kurzban, Tooby, & Cosmides, 2001; Van Vugt & Park, 2010; Miller, Maner, &
64 Becker, 2010; Voorspoels, Bartlema, & Vanpaemel, 2014).

65 Underscoring the motivational salience of coalitions in everyday behavior, a common
66 feature of much contemporary popular culture is the use of dress and other aspects of appearance
67 to overtly advertise coalitional affiliation, with sport fandom figuring prominently in this regard.
68 Conspicuously signaling coalition membership in any social context not composed exclusively
69 of one's coalition-mates may constitute both an implicit challenge to any members of rival
70 coalitions present and an objective commitment device. An objective commitment device is any

71 action that narrows the available range of options (Fessler & Quintelier, 2013), in this case
72 making it difficult for the individual to disavow membership in the advertised coalition should
73 conflict erupt. Objective commitment differs from subjective commitment in that issues of
74 sentiment are germane to the latter but not to the former – if violence breaks out, an objectively
75 committed actor must side with his coalition regardless of how strongly he identifies with that
76 group. This is relevant both because objective commitment devices can be observed by others
77 (whereas sentiments cannot), and because, unlike subjective commitment, objective commitment
78 cannot wane. Together, these make it possible for observers to predict an individual’s behavior
79 on the basis of objective commitment with greater certainty than is true with regard to subjective
80 commitment (Fessler & Quintelier, 2013). Hence, in situations in which one may encounter
81 members of rival coalitions, advertising coalitional membership can both invite conflict with
82 others and make it likely that, if conflict occurs, the advertiser will be an active participant.

83 In situations in which conflict may erupt, actors must quickly decide whether to fight,
84 flee, negotiate, or appease. A fundamental determinant of this decision is relative formidability
85 (i.e., the threat that an opponent poses, determined in part by relative fighting capacity), as
86 individuals must rapidly assess the prospective foe’s aggressive capabilities relative to their own.
87 Individuals should therefore be sensitive to cues that reveal attributes of others contributing to
88 relative formidability. We propose that advertising coalitional membership in social contexts
89 that include members of rival coalitions may be taken both as an implicit challenge to rivals, and
90 as an objective commitment device that cements the association between the advertiser and one
91 side in any conflict. Therefore, witnessing an actor visibly advertise coalitional membership in
92 such contexts should inflate observers’ assessments of the actor’s formidability, for three
93 reasons. Firstly, an individual who invites conflict may be presumed to be more dangerous than

94 an individual who shies away from conflict. Secondly, individuals who are objectively
95 committed to their coalitions, having removed the option of feigning neutrality, are more
96 motivated to fight for their side. (Note that this will be true regardless of whether allies are
97 present – while the enhanced formidability attributed to an objectively committed actor will be
98 bolstered by the presence of fellow fighters, it is not inherently dependent on this.) Finally, both
99 the willingness to risk conflict and the decision to commit oneself to one side of a potential
100 conflict will often be indicative of an aggressive disposition.

101 Knowing that an actor advertises coalitional membership in the presence of members of a
102 rival coalition is one of many relevant factors when calculating relative formidability. This
103 complex assessment must often be completed rapidly, as ponderous decision-making in
104 situations of potential conflict can be disastrous. Complex decision-making can often be
105 facilitated via a single representation that acts as a running tally, summarizing factors
106 contributing to the likely outcome, and possible costs, of violent conflict. Our research group
107 has previously postulated that, reflecting both the phylogenetic antiquity and ontogenetic
108 ubiquity of the importance of physical size and strength in violent conflicts, these dimensions
109 constitute the basis for a summary representation of formidability (Fessler, Holbrook, & Snyder,
110 2012). Below we explain this logic and summarize evidence in support of it.

111 Despite the equalizing nature of modern weapons, size and strength continue to play a
112 role in aggressive behavior today. As is evident in martial arts competitions, height is a factor in
113 human fighting ability (Collier, Johnson, & Ruggiero, 2012), and, correspondingly, observers
114 assess fighting ability in part as a function of a man's height (Sell et al., 2009). Likewise,
115 relative size is a key factor when determining whether to escalate agonistic interactions (Archer
116 & Benson, 2008), and, correspondingly, larger people report engaging in physical aggression

117 more than smaller people (Felson, 1996; Archer & Thanzami, 2007). Similarly, in keeping with
118 their reduced vulnerability to attack, taller men are less sensitive to cues of dominance than
119 shorter men (Watkins et al., 2010). Parallel patterns are evident with regard to strength, a
120 fundamental factor in men's fighting capacity (Sell, Hone, & Pound, 2012). A man's strength
121 predicts observers' judgments of his fighting capacity (Sell et al., 2009) as well as his own
122 aggressive and self-interested attitudes and actions (Archer & Thanzami, 2009; Sell, Tooby, &
123 Cosmides, 2009; Hess, Helfrecht, Hagen, Sell, & Hewlett, 2010; Sell et al., 2012; Muñoz-Reyes,
124 Gil-Burmann, Fink, & Turiegano, 2012; Petersen, Sznycer, Sell, Cosmides, & Tooby, 2013; but
125 see also Price, Dunn, Hopkins, & Kang, 2012 for caveats).

126 In regard to both behavior and observers' predictions thereof, humans thus maintain a
127 pattern found throughout the animal kingdom wherein size and strength are positively correlated
128 with fighting capacity. This association is reinforced during development, as children experience
129 conflicts (including with caregivers) in which size and strength determine which party gets their
130 way; correspondingly, even before they can speak, infants expect larger agents to best smaller
131 agents when interests conflict (Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011).

132 Abstract concepts across domains have been proposed to be grounded in sensorimotor
133 simulations drawn from relatively concrete domains of embodied experience (Barsalou, 1999;
134 Lakoff & Johnson, 1980), and a growing literature shows that metaphorical conceptualizations
135 can structure reasoning in threat-related domains, such as decision-making about how best to
136 address violent crime (e.g., Thibodeau & Boroditsky, 2011). Combined with the above
137 observations, this suggests that, as we have previously proposed, the mind will harbor a deep
138 association between size, strength, and fighting capacity. In turn, this association provides the
139 dimensions for a representation that can be employed to summarize diverse factors influencing

140 the threat that an antagonist poses. In essence, a minds-eye image of the envisioned bodily
141 features of an antagonist encapsulates evaluations of many features of the self and the other
142 relevant to threat assessment (Fessler et al., 2012). Consistent with this hypothesis, knowing that
143 an antagonist possesses a weapon (Fessler et al., 2012) or is inclined to take physical risks
144 (Fessler, Tiokhin, Holbrook, Gervais, & Snyder, 2014a; Fessler, Holbrook, Tiokhin, & Snyder,
145 2014c) increases how large and muscular observers think he is. Such judgments are likewise
146 affected by the observer's own physical strength (Fessler, Holbrook, & Gervais, 2014b) and,
147 conversely, temporary incapacitation (Fessler & Holbrook, 2013a); being the parent of
148 vulnerable children (Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014d); being in a
149 vulnerable phase of the menstrual cycle (Fessler, Holbrook, & Fleischman, 2015); the physical
150 proximity of one's friends (Fessler & Holbrook, 2013b); and information regarding the
151 effectiveness of leaders (Holbrook & Fessler, 2013) or a target's ethnic identity (Holbrook,
152 Fessler, & Navarrete, 2015). Complementing these findings, Yap et al. (2013) have
153 demonstrated that leading participants to experience themselves as having more or less social
154 power causes inverse changes in their estimates of another's size and weight. Likewise, Duguid
155 and Goncalo (2012) have shown that feelings of power lead participants to overestimate their
156 own height and underestimate another's.

157 Understanding the representational system employed in agonistic contexts provides a tool
158 for exploring the impact of advertisements of coalitional membership, as follows:

- 159 1. If people conceptualize the relative formidability of a potential antagonist in terms of the
160 target individual's envisioned size and strength, and
- 161 2. If advertising coalitional membership in socially heterogeneous contexts is both an
162 implicit challenge and a corresponding objective commitment, then

163 3. Knowing that the target individual advertises his coalitional membership while in the
164 presence of members of rival coalitions should lead people to envision him as larger and
165 stronger than others who do not engage in such behavior.

166 We tested this prediction in two experiments.

167 Some coalitions exist primarily or exclusively to achieve their objectives via violent
168 conflict. Given the above considerations, it is understandable that visible ritual body
169 modification is more common in societies in which intergroup warfare occurs frequently than in
170 societies that are peaceful or suffer intragroup conflict (Sosis, Kress, & Boster, 2007). Likewise,
171 U.S. prison gangs engaged in endemic violent conflict employ tattoos to mark coalitional
172 affiliation. Consonant with the signaling function discussed above, these tattoos differ in their
173 prestige value as a function of their visibility (Phelan & Hunt, 1998): the more visible the tattoo,
174 the stronger the challenge it presents to rivals, and the more it commits the bearer to side with the
175 gang, and thus the greater the prestige accorded it within the group; correspondingly, tattoos
176 correlate with involvement in violence (Bales, Blomberg, & Waters, 2013). While these
177 examples illustrate how coalitional marking operates under extreme conditions, the
178 aforementioned logic of signaling is not limited to coalitions that exist solely to pursue goals
179 through violent conflict. Rather, this logic potentially applies to any situation in which there is a
180 possibility that conflicts between coalitions could turn ugly. Although isolated incidents of
181 violence between fans of rival sports teams have occurred in the U.S., American sports do not
182 suffer the perennial violence that has plagued European football (soccer) matches. Accordingly,
183 fandom in the U.S. offers an opportunity to investigate the proposal that individuals who mark
184 their coalitional affiliation in socially heterogeneous contexts should be viewed as more
185 formidable even when the coalitions at issue do not primarily revolve around violent conflict.

186 Because visual markers are the most common form of signaling coalitional affiliation, we
187 sought to initially test the prediction at issue using visual stimuli. However, although clothing is
188 a common means of signaling team affiliation, it is important that participants not have access to
189 information regarding the target individual's actual bodily proportions, as our prediction
190 concerns how participants will envision the target, not how accurately they can assess the
191 target's physique when given the opportunity. We therefore manipulated facial decoration in
192 photographs depicting only a sports fan's face.

193 The complete datasets for both studies reported in this paper are archived at
194 <http://www.escholarship.org/uc/item/28k1048m>.

195 **Study 1**

196 **Methods**

197 **Participants and overview of procedure.** After obtaining ethical approval from the
198 University of California, Los Angeles Institutional Review Board, 250 adult UCLA students
199 were recruited on the UCLA campus for a field study advertised as a survey of "Visual
200 Inferences Across Domains," for \$3 compensation. Data were pre-screened to ensure
201 participants completed the entire study, reported being native English speakers, and identified
202 with UCLA. The final sample consisted of 222 adults (60.4% female; 45.5% White; 23.0%
203 Asian; 31.5% Other) ranging in age from 18 to 47 ($M = 21.01$, $SD = 3.55$).

204 Following the collection of informed consent, in a within-subjects design, participants
205 rated the physical formidability of two men based on cropped images of their faces (see Figure
206 1). The images, presented in color, were actually composites created using methods described in
207 Tiddeman et al. (2001); each composite was composed of photos of 25 different men displaying
208 a neutral expression (average age for each composite = 24.2 years; $SD = 3.65$ years for one

209 composite, and 4.37 years for the other). Both photographs were described as having been taken
210 at a recent sports event held at UCLA. Constituting the experimental condition, one of the two
211 faces was digitally modified, making it appear that the man's face was painted in support of the
212 University of Southern California, UCLA's crosstown rival; the other face, constituting the
213 control condition, was unpainted. Which of the two composite faces was painted was
214 counterbalanced across participants, as was the order in which the images were presented.

215 Participants estimated the target's bodily muscularity, overall size, and height, in fixed
216 order. Height was estimated in feet and inches; muscularity and overall size were estimated
217 using 6-point image arrays (see Figure 1). Estimated physical formidability was composited
218 using standardized values for estimated height, overall size, and muscularity ($\alpha = .70$). The
219 standardized values were calculated by subtracting the mean rating in the entire sample from the
220 individual rating, then dividing this difference by the standard deviation for the sample.
221 Accordingly, composite scores above zero are above average for the entire sample, and
222 composite scores less than zero are below average for the entire sample. The physical
223 formidability measures were camouflaged within several filler perceptual judgments involving
224 intuitive estimates based on incomplete information.

225 Formidability is necessarily relative, and the threat that an antagonist poses will be a
226 function of a variety of attributes of the self. To help gauge whether participants' estimates of
227 the bodily proportions of the target indeed reflect the threat that the participant views the target
228 as posing, within a set of demographic questions we therefore asked participants "Relative to the
229 typical person of your gender, how good at physical fighting would you be, if attacked?" (1 = *No*
230 *good at all / Defenseless*; 9 = *Extremely capable / Lethal if necessary*).

231 **Results**

232 **Envisioned physical formidability.** To compare the overall estimated physical
233 formidability of the signaling versus control targets in this within-subjects design, the height,
234 muscularity, and size estimate scores were first reformatted as long form variables, then
235 standardized and averaged into a single measure of composite physical formidability (a z-score).
236 As predicted, the target individual's envisioned physical formidability was greater in the
237 signaling condition ($M = .07, SD = .66$) than in the control condition ($M = -.07, SD = .80$), $F(1,$
238 $442) = 3.93, p < .05, \eta^2_p = .01, 95\% CI = (-.275, -.001)$. We next conducted follow-up repeated-
239 measures ANOVAs assessing the individual dimensions of envisioned physical formidability.
240 The target in the signaling condition was estimated to be significantly taller, but did not differ in
241 envisioned muscularity or overall size (see Table 1). There were no effects of participant gender,
242 or interactions between gender and condition, on the envisioned physical height, size, or
243 muscularity of the target, $ps > .12$.

244 ***Self-assessed fighting ability and envisioned physical formidability.*** Consistent with
245 predictions, the envisioned physical formidability of the signaling target was negatively
246 correlated with participants' self-assessed defensive fighting ability, $\beta = -.15, p < .03$. The
247 negative correlation between self-assessed fighting ability and estimations of the control target's
248 envisioned physical formidability was not significant, $\beta = -.11, p < .10$. Participants differed in
249 self-assessed fighting ability by gender (Females: $M = 3.43, SD = 1.36$; Males: $M = 4.15, SD =$
250 1.34), but we observed no Gender \times Fighting Ability moderation of the link between fighting
251 ability and the envisioned formidability of either target, $ps > .06$.

252 **Discussion**

253 Consonant with the thesis that displaying coalitional affiliation in the presence of
254 members of a rival coalition signals a willingness, and a commitment, to engage in agonistic

255 interaction, the envisioned physical formidability of an attendee at a sporting event is enhanced
256 when the target is a putative supporter of a rival sports team who is wearing face paint in support
257 of his team. Bolstering the conclusion that this reflects a construal of the painted individual as
258 more threatening, participants' self-reported defensive fighting ability was negatively correlated
259 with the envisioned bodily dimensions of the painted target.

260 Though consistent with our thesis, the core results of Study 1 might be due to the
261 influence of folk models incidental to the hypothesis at issue, such as the observation that avid
262 sports fandom is associated with athleticism and masculinity (Wann, Waddill, & Dunham, 2004),
263 attributes that may influence envisioned bodily dimensions without being directly tied to
264 potential threat. Moreover, it is possible that, independent of issues of coalitional conflict, the
265 act of simply painting one's face in a flamboyant manner for presentation in a highly public
266 context conveys a propensity to take risks, a trait that leads participants to envision the target as
267 physically formidable (Fessler et al., 2014a; Fessler et al., 2014c). Lastly, half of the painted
268 individual's face was red, and prior research indicates that observers may view individuals
269 associated with this color as more aggressive and dominant (Hagemann, Strauss, & Leißing,
270 2008; Wiedemann, Burt, Hill, & Barton, 2015), an assessment that, in turn, would lead to greater
271 envisioned physical formidability.

272 In Study 1, we measured envisioned bodily traits, but did not directly measure
273 perceptions of the threat posed by the target individuals, hence ideas orthogonal to violence, such
274 as notions of athleticism, might well be involved. Moreover, although the signaling hypothesis
275 holds that information regarding relative formidability is being broadcast, and hence is available
276 to allies and third parties as well as opponents, nevertheless, given that our participants in Study
277 1 were presented with a signaling target belonging to a rival coalition, it is possible that the effect

278 obtained in Study 1 does not generalize beyond the limited situation of individuals who are
279 assessing members of an opposing faction.

280 To address these limitations, we conducted a second study, using vignettes to present a
281 context of political – not athletic – rivalry, one in which there is a long history of violent
282 coalitional conflict, but in which our participants were not involved. In addition to the measures
283 used in Study 1, we employed direct assessments of the danger that the target is seen to pose, and
284 his intentions as regards possible violence.

285

286 **Study 2**

287 **Methods**

288 **Participants and overview of procedure.** After obtaining ethical approval from the
289 UCLA Institutional Review Board, 300 adult participants living across the U.S. were recruited
290 via Amazon’s MechanicalTurk.com survey platform for an online study advertised as a survey of
291 “Social Intuitions from Limited Information”, in exchange for \$0.25 compensation. Data were
292 pre-screened for complete participation, repeat participation, and correctly answering a “catch
293 question”. The final sample consisted of 265 adults (32.8% female; 77.7% White) ranging in age
294 from 18 to 67 ($M = 28.87$, $SD = 9.59$).

295 Following the collection of informed consent, in a between-subjects design, participants
296 were randomly assigned to read a vignette about a fictional man who either did or did not signal
297 his coalitional affiliation in a context of potential conflict:

298 Since the 1960s, Northern Ireland has been plagued by violent conflict
299 between two groups. Most members of the Protestant community want Northern
300 Ireland to remain part of the United Kingdom. Most members of the Catholic

301 community want Northern Ireland to join the Republic of Ireland. Although large-
302 scale bombings and attacks have been significantly reduced for the past 15 years,
303 sporadic violence continues to this day. For historical reasons, the color orange
304 symbolizes the Protestant community, while green symbolizes the Catholic
305 community.

306 Jack is a Protestant who attends college in Belfast, the largest city in
307 Northern Ireland. He enjoys soccer and avidly follows games on television. On
308 Saturday nights, he and his friends like to watch the soccer match on TV and play
309 darts at a pub near the university which caters to both Protestant and Catholic
310 students. Whenever they do, Jack wears a nondescript grey tee shirt and a jacket
311 with a soccer ball [a bright orange tee shirt and a jacket with a British flag]
312 painted on the back.

313 Next, participants estimated the target's bodily traits in fixed order: height, muscularity, and size,
314 using the measures employed in Study 1. Estimated physical formidability was composited
315 using standardized values for estimated height, overall size, and muscularity ($\alpha = .60$).

316 Following the ratings of the target's bodily traits, participants rated the threat that he
317 posed: "How dangerous do you think the man might be if a fight were to break out?" (1 = *Not at*
318 *all Dangerous*; 9 = *Extremely Dangerous*). To assess the possibility that participants might infer
319 that the man's choice of attire reflects a desire to initiate a confrontation, we asked: "What sort of
320 intentions do you think that the man has in the bar?" (1 = *Innocent / Non-violent Intentions*; 9 =
321 *Extremely Violent Intentions*). As in Study 1, participants rated their own defensive fighting
322 ability, answered a suspicion probe, and were debriefed.

323 **Results**

324 **Envisioned physical formidability.** Replicating the findings of Study 1, the target
325 individual's envisioned physical formidability was greater for the target in the signaling
326 condition ($M = .11, SD = .77$) than for the control target ($M = -.13, SD = .67$), $F(1, 263) = 7.60, p$
327 $< .01, \eta^2_p = .03, 95\% CI = (-.421, -.070)$. Follow-up tests assessing the individual dimensions of
328 envisioned physical formidability showed significant differences in estimated height and
329 estimated size according to the silhouette array, with a similar trend for estimated muscularity
330 (see Table 2). There were no effects of participant gender, or interactions between gender and
331 condition, on the envisioned height, size, or muscularity of the target, $ps > .15$.

332 **Envisioned physical formidability and self-assessed fighting ability.** Envisioned target
333 physical formidability was significantly negatively correlated with participants' self-assessed
334 defensive fighting ability in the sample as a whole, $b = -.06, SE = .02, \beta = -.17, p < .01$.
335 Subsequent moderation analyses showed no significant two-way interactions with gender or
336 condition on the correlation between self-assessed fighting ability and envisioned physical
337 formidability, $ps > .14$. Nevertheless, exploratory tests showed that, within the signaling
338 condition, envisioned fighting ability was negatively correlated with envisioned physical
339 formidability, $\beta = -.23, p < .01$, whereas no such association held within the control condition, β
340 $= -.07, p = .45$.

341 We next tested for potential three-way interactions between participant condition, gender,
342 and self-assessed fighting ability. In a model including participant gender, condition, and
343 fighting ability as predictors, the interactions between these variables, and the three-way
344 interaction term, the overall regression was significant, $R = .291, R^2 = .084, \text{adjusted } R^2 = .060,$
345 $F(7, 257) = 3.39, p < .01$, and there was a marginally significant Gender \times Condition \times Fighting
346 Ability interaction, $b = -.18, SE = .09, \beta = -1.96, p = .053$. Within the control condition, neither

347 male nor female participants evinced significant correlations between self-assessed fighting
348 ability and the target's envisioned formidability, $ps > .48$. Within the male subsample of the
349 signaling condition, however, there was a strong negative correlation between self-assessed
350 fighting ability and the envisioned physical formidability of the target, $\beta = -.37, p < .001$; no such
351 association held within the female subsample, $p = .98$.

352 **Envisioned threat and violent intentions.** As predicted, the target individual's
353 envisioned threat was significantly greater for the target in the signaling condition than for the
354 control target (see Table 2). Likewise, consistent with the notion that participants associate
355 choosing to display coalitional affiliation with aggression, the signaling target was rated as
356 having greater violent intent than the control target (see Table 2). There were no effects of
357 gender, or interactions between gender and condition, on the envisioned threat or violent
358 intentions of the target, $ps > .08$.

359 **Envisioned threat and physical formidability.** As predicted, envisioned target physical
360 formidability was positively linked to perceived target threat (pooling conditions), $\beta = .23, p$
361 $< .001$. Subsequent moderation analyses revealed no significant interaction with condition on
362 the correlation between perceived threat and envisioned physical formidability, $p > .09$.

363 Exploratory follow-up tests revealed that, within the signaling condition, perceived threat was
364 positively correlated with envisioned physical formidability, $\beta = .25, p < .01$, whereas no such
365 association held within the control condition, $\beta = .06, p > .48$. Thus, the positive correlation
366 between envisioned physical formidability and threat observed in the entire sample was driven
367 by the signaling condition.

368 We observed a significant interaction with participant gender. In a model including
369 gender, envisioned formidability, and the interaction term, the overall regression was significant,

370 $R = .274$, $R^2 = .075$, adjusted $R^2 = .064$, $F(7, 261) = 7.06$, $p < .001$, and there was a significant
371 Gender \times Formidability interaction, $b = .47$, $SE = .24$, $\beta = .46$, $p < .05$. Within the male
372 subsample of the signaling condition, there was a strong positive correlation between perceived
373 threat and the envisioned physical formidability of the target, $\beta = .31$, $p < .001$, whereas no such
374 association held within the female subsample, $p = .62$. We observed no three-way Gender \times
375 Condition \times Formidability moderation of the link between perceived threat and formidability.

376 **Mediation analysis.** To assess whether the heightened physical formidability attributed
377 to the signaling target was mediated by attributions of threat, we conducted a mediation test
378 utilizing the bias-corrected bootstrapping procedure (5,000 samples) in the INDIRECT macro for
379 SPSS (Preacher & Hayes, 2008). The signaling condition was the independent variable,
380 estimated physical formidability was the dependent variable, and the threat score was the
381 mediating variable. As predicted, perceptions of relatively greater threat mediated the effect of
382 the signaling condition on estimated physical formidability. The direct effect of condition on
383 estimated physical formidability ($b = .25$, $SE = .09$, $\beta = .17$, $p < .01$) was reduced with threat
384 included in the bootstrap model ($b = .12$, $SE = .10$, $\beta = .08$, $p = .22$), the indirect effect of threat
385 on estimated physical formidability remained significant ($b = .11$, $SE = .04$, $\beta = .20$, $p < .01$), and
386 the confidence intervals did not overlap with zero (95% CI = [.04, .24]).

387

388 **Discussion**

389 Reading vignettes describing a situation of political conflict with a history of actual
390 violence, third-party observers assessed an individual who conspicuously advertised his
391 coalitional affiliation as more physically formidable, posing a greater threat to others, and more

392 inclined to violence, than an individual who, despite having the same coalitional affiliation, did
393 not signal it in this manner.

394 Previously, our research group demonstrated that men’s own muscular strength is
395 negatively correlated with their assessments of the bodily dimensions of armed individuals, who
396 pose an implicit threat, but is not correlated with their assessments of unarmed individuals, who
397 pose no such threat (Fessler et al., 2014b). Paralleling these findings, in the present study we
398 found a marked negative correlation between male participants’ self-assessed fighting ability and
399 the envisioned physical formidability of the target individual when the latter displays a signal of
400 coalitional affiliation (and thus reveals an inclination for, and objective commitment to,
401 aggression), but not when the target displays no such signal. Similarly, again only in the
402 signaling condition, we found a substantial positive correlation between male participants’
403 assessments of the threat posed by the target and his envisioned physical formidability. While
404 the basic representational system at issue appears to operate similarly in men and women (see
405 Fessler et al., 2012; Fessler et al., 2014a; Fessler et al., 2014c; Fessler et al., 2014d),
406 nevertheless, we can expect that, by virtue of men’s greater participation in coalitional
407 aggression, male psychology will be particularly sensitive to factors relevant to intergroup
408 conflict (Van Vugt, 2009; McDonald, Navarrete, & Van Vugt, 2012), and thus men will be more
409 attuned than women to indications that a man is advertising coalitional affiliation in a manner
410 that constitutes both an implicit challenge to members of rival groups and an objective
411 commitment device.

412

413 **Conclusion**

414 In situations involving interaction with members of rival coalitions, individuals who
415 overtly display indications of coalitional affiliation can be seen as simultaneously challenging
416 their opponents to engage in conflict, and committing themselves to enter such conflict should it
417 erupt. If violence is a possibility, those who are willing to engage in it, and are committed in a
418 manner that makes it difficult to escape, constitute more dangerous adversaries than those who
419 lack these properties; that is, they should be assessed as more formidable. Across two studies,
420 using very different stimuli and quite different samples, we investigated people's assessments of
421 individuals who, via intentional aspects of their appearance, conspicuously advertised their
422 coalitional affiliation in potentially conflictual situations. In both studies, we found that
423 participants envisioned such signalers to be more physically imposing than individuals who did
424 not advertise their coalitional affiliation, a pattern explicable in terms of the use of envisioned
425 size and strength to summarize another's relative formidability.

426 Our research is subject to a number of limitations. First, given both the small number of
427 contexts we explored and our reliance on samples from the U.S., our results should be taken as
428 preliminary. Second, although we interpret participants' estimates of the size and strength of the
429 signaling targets as reflecting the workings of a representational system that summarizes issues
430 of threat and relative formidability using these dimensions, we cannot rule out an alternative
431 explanation, one based on participants' possible prior beliefs. Given that, as discussed in the
432 Introduction, bodily size and physical strength influence a man's propensity to engage in
433 violence and other assertive or coercive behavior, participants' responses could conceivably
434 reflect epidemiological knowledge derived from quotidian observations. Larger, stronger men
435 may be more likely than smaller, weaker men to conspicuously display signals of coalitional
436 affiliation in situations of potential conflict with rival groups, and hence participants could be

437 drawing upon past experience when estimating the target's size and muscularity. We have
438 previously demonstrated that accounts of this type cannot explain other applications of the
439 representation-of-relative-formidability hypothesis, namely gun ownership (Fessler et al., 2012)
440 and risk-proneness (Fessler et al., 2014a). Nevertheless, we cannot rule out such an explanation
441 here, hence future investigations should address this question. Third, because men pose a greater
442 threat of violence than do women, we limited our stimuli to male targets, reasoning that such
443 stimuli should present the clearest test of participants' predicted reactions to signals of
444 coalitional affiliation. Although prior research indicates that the same representational system is
445 employed in assessments of both male and female targets (Fessler et al. 2014a; Fessler et al.
446 2014c), and although our theory of objective commitment and dispositional cuing predicts that
447 responses to coalitional signals should apply to actors of both sexes, nevertheless, because we
448 did not employ female targets in our experiments, this possibility remains unexplored at present.
449 Fourth, given the preliminary nature of our investigation, we have favored experimental control
450 over ecological validity, hence our stimuli and dependent measures are considerably removed
451 from real-world interactions. In the future, it will be important to determine whether actual
452 behavior toward target individuals is influenced by the latter's signaling of coalitional affiliation
453 in socially heterogeneous contexts, and whether such behavior is undergirded by representations
454 of relative formidability. Relatedly, given the size and cultural plurality of contemporary
455 industrialized nations such as the U.S., and the correspondingly broad range of coalitions, absent
456 compellingly salient contexts of rivalry such as athletic or political contests, the average person
457 may well be relatively indifferent to signals of coalitional affiliation. Identifying the boundary
458 conditions, and determinants thereof, of the phenomenon at issue will therefore be important.

459 Although prior work summarized in the Introduction indicates that both envisioned size
460 and envisioned muscularity are used to represent relative formidability, in the present studies,
461 only the target's envisioned stature/size displayed the predicted pattern, with envisioned
462 muscularity not differing across conditions in Study 1, and displaying only a trend in the
463 predicted direction in Study 2. Given that stature is associated with both dominance and
464 prestige, while muscularity is more clearly linked to dominance (reviewed in Blaker & Van
465 Vugt, 2014), might participants be construing targets who signal coalitional affiliation not as
466 more formidable, but as more prestigious? This is unlikely given that a) the target in Study 1
467 was a member of a rival coalition, making participants more likely to disparage than admire him,
468 and b) per predictions, the target in Study 2 was viewed as prone to violence, a characteristic
469 generally antithetical to prestige. The prior literature on representations of formidability
470 indicates that the precise relationships between envisioned height, envisioned size, and
471 envisioned muscularity fluctuate somewhat from study to study, most likely reflecting noise. If
472 so, then future experiments, employing larger samples and a broader range of stimuli, should
473 reveal that targets who signal coalitional affiliation in potentially conflictual contexts are
474 conceptualized as both larger and more muscular.

475 Although the propensity for violence reduces prestige in most contexts, situations of
476 actual or potential agonistic intergroup conflict are a prominent exception. As evidenced by the
477 status implications of different types of tattoos among gang members, in violent intergroup
478 conflict prestige is frequently assigned to in-group members who evince properties of value in
479 combat, including both objective commitment to the in-group and aggressive propensities. The
480 present research examined assessments of a rival out-group member (Study 1) and a contestant in
481 a conflict to which the observer is not a party (Study 2); hence, these investigations do not afford

482 examination of the assignation of prestige to in-group members during conflicts. In conducting
483 such research, it will be important to measure both perceived threat and prestige in addition to,
484 and independent of, envisioned physical formidability, as prior research indicates that, consonant
485 with a phylogeny wherein hominid hierarchies have largely shifted from a dominance basis to a
486 prestige basis, the same representational system employed to summarize formidability can also
487 be used to represent prestige (Holbrook et al., under review).

488 If supported by subsequent research, there are numerous implications to our conclusion
489 that observers' impressions of the bodily dimensions of those who conspicuously display
490 coalitional affiliation reflects their assessments of the threat that such actors pose by virtue of
491 intent, inclination, and objective commitment. For example, this could offer an unobtrusive
492 avenue for investigating the extent to which the potential for aggression may lurk behind such
493 seemingly innocuous actions as consumer displays of brand loyalty – a behavior that, in at least
494 some instances, can lead to violent coalitional conflict (Ewing, Wagstaff, & Powell, 2013).
495 Ultimately, a fuller understanding of the impact of indices of coalitional affiliation may enhance
496 our ability to predict when and where violence will break out, potentially affording preventative
497 measures in a wide variety of contexts.

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499

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505

506 **Conflict of Interest**

507 The authors have no conflict of interest to declare.

508

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664 Table 1

665 *Mean Estimated Height, Size, and Muscularity (Study 1)*

	Signaling	Control			
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>F</i>	<i>p</i>	η^2_p
Height	70.40 (2.12)	68.03 (5.52)	47.47	<.001	.18
Size	3.90 (.96)	3.98 (.88)	1.95	.164	.01
Muscularity	2.47 (.83)	2.50 (.88)	.50	.482	.00

666 Note. *N* = 222. Estimated heights are in inches.

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683 Table 2

684 *Mean Estimated Height, Size, Muscularity, Threat, and Violent Intent (Study 2)*

	Signaling	Control				
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>F</i>	<i>p</i>	η^2_p	95% CI
Height	71.34 (2.42)	70.73 (2.33)	4.34	.038	.02	-1.184, -.033
Size	4.12 (.81)	3.89 (.83)	5.04	.026	.02	-.425, -.028
Muscularity	2.36 (.95)	2.17 (.74)	3.13	.078	.01	-.392, .021
Threat	3.45 (1.35)	2.28 (1.03)	62.10	<.001	.19	-1.455, -.873
Violent Intent	3.24 (1.40)	1.78 (1.00)	94.37	<.001	.26	-1.755, -1.164

685 Note. *N* = 265. Estimated heights are in inches.

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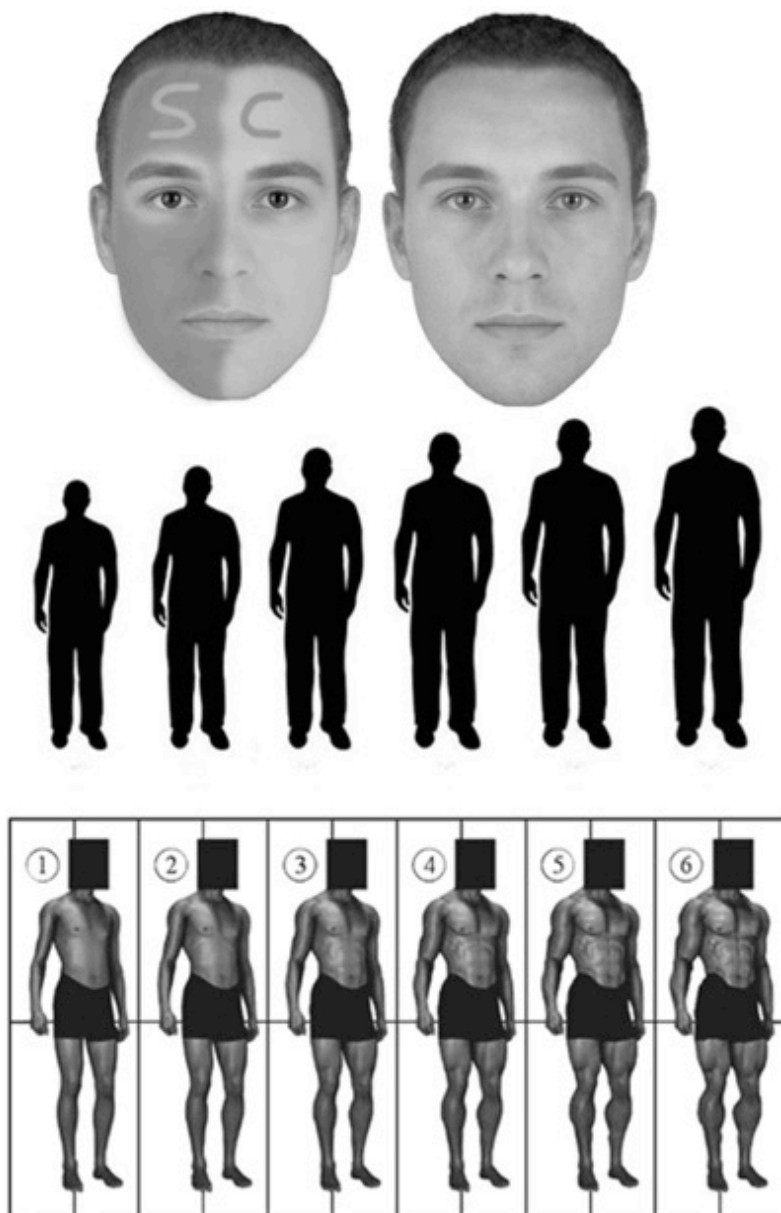
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698 Figure 1. *Top*: In Study 1, two different composite faces were presented in color with or without
699 University of Southern California (USC) facepaint; one such pair is depicted here. *Middle*:
700 Array used by participants in Studies 1 and 2 to estimate overall size. *Bottom*: Array used by
701 participants in Studies 1 and 2 to estimate muscularity; modified with permission from Frederick
702 and Peplau (2007).



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