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Main manuscript for:

Intergroup preference, not dehumanization, explains social biases in emotion attribution

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Author Contributions

FE, HO and ST conceptualised and designed the experiments. FE collected and analysed the data. FE and HO wrote the original draft. All authors edited and reviewed the manuscript.

Competing interests

The authors declare no competing interests.

Abstract

Psychological models can only help improve intergroup relations if they accurately characterise the mechanisms underlying social biases. The claim that outgroups suffer dehumanization is near ubiquitous in the social sciences. We challenge the most prominent psychological model of dehumanization - infrahumanization theory - which holds outgroup members are subtly dehumanized by being denied human emotions. We examine the theory across seven intergroup contexts in thirteen pre-registered and highly powered experiments ($N=1,690$). We find outgroup members are not denied uniquely human emotions relative to ingroup members. Rather, they are ascribed prosocial emotions to a lesser extent but antisocial emotions to a greater extent. Apparent evidence for infrahumanization is better explained by ingroup preference, outgroup derogation and stereotyping. Infrahumanization theory may obscure more than it reveals about intergroup bias.

Keywords: Dehumanization, infrahumanization, social cognition, intergroup bias, prejudice.

1. Introduction

The claim that outgroup members are perceived as 'less than human' has been extremely influential in social psychology, social neuroscience, philosophy and sociology. It has entered into public rhetoric as well, regularly being discussed in the media. Blatant forms of dehumanization are thought to reveal themselves in propaganda and other forms of hate speech in which outgroup members are described as less than human creatures, for example as similar to rats, parasites or vermin (Haslam, 2006; Smith, 2011). Blatant dehumanization has been linked to extreme intergroup harm such as genocide, torture and police brutality towards African Americans (Goff et al., 2008, 2014; Smith, 2011; Tirrell, 2012).

Subtler forms of dehumanization, in which outgroups are considered somewhat less human, are hypothesised to be widespread and are typically studied in lab-based settings (Harris & Fiske, 2006; Haslam, 2006; Leyens et al., 2000, 2001). In subtle forms of dehumanization, outgroup members are thought to possess uniquely human qualities to a lesser extent than do the ingroup. Three psychological models of subtle dehumanization have been particularly prominent. According to Harris & Fiske (2006), to the extent outgroups are dehumanized, they are thought to possess mental states to a lesser extent than do the ingroup. According to the dual model, outgroups are thought to possess uniquely human character traits to a lesser extent than do the ingroup (Haslam, 2006). According to infrahumanization theory, perhaps the most prominent of the three models, outgroups are thought to possess uniquely human emotions to a lesser extent than do the ingroup (Leyens et al., 2000, 2001). These subtle forms of dehumanization have been linked to negative outcomes including reduced prosocial behaviour

25 towards outgroups (Cuddy et al., 2007; Vaes et al., 2003). In a world of social
26 division, with frequently occurring cases of discrimination based on religion, ethnicity
27 and gender, to name only a few, understanding the extent and consequences of
28 dehumanization is crucial.

29 In recent years, several theoretical critiques of research on dehumanization
30 have emerged (Appiah, 2008; Bloom, 2017; Lang, 2010, 2020; Manne, 2016, 2018;
31 Over, 2020a, 2020b; Rai et al., 2017; Smith, 2014, 2020). These critiques suggest
32 that perceiving outgroups as 'less than human' might be less common than it first
33 appears. Considering blatant dehumanization, as evidenced by historical examples
34 of propaganda, Manne (2016) and Bloom (2017) have both pointed out that victims
35 said to be 'dehumanized' are often described with terms that only really make sense
36 when applied to humans, albeit negative and antisocial ones. For example, in Nazi
37 propaganda, Jewish people were frequently described as ruthless, corrupt,
38 treacherous and criminally minded, terms out of place when used to describe an
39 animal or a machine. Relatedly, the hypothesised causal connection between
40 dehumanization and intergroup harm has been questioned. Several theorists
41 suggest that being perceived as having certain human qualities, such as being
42 corrupt, spiteful or deceptive, may actually increase people's risk of harm (Appiah,
43 2008; Bloom, 2017; Lang, 2010, 2020; Manne, 2016, 2018; Over, 2020a, 2020b).
44 Empirical research showing that morally-motivated intergroup harm is not linked to
45 dehumanization lends support to these critiques (Rai et al., 2017).

46 Turning to lab-based research, Over (2020a, 2020b) argues that what
47 appears to be evidence for dehumanization, as operationalised by the dual model
48 (Haslam, 2006) and infrahumanization theory (Leyens et al., 2000; 2001), may be

49 better explained in terms of intergroup preference effects (a general tendency to
50 prefer the ingroup to the outgroup). According to the dual model of dehumanization,
51 outgroup members tend to be attributed uniquely human character traits to a lesser
52 extent than are the ingroup (Haslam, 2006). However, to date, the overwhelming
53 majority of the traits included in empirical research are socially desirable, for
54 example, warmth, rationality, civility and refinement. Over (2020a; 2020b)
55 hypothesises that while outgroup members may be thought to possess some
56 uniquely human qualities to a lesser extent, for example, civility, refinement and
57 rationality, there may be other uniquely human qualities that are more strongly
58 attributed to the outgroup than the ingroup. For example, antisocial human
59 characteristics such as jealousy, arrogance and bitterness seem to only make sense
60 in the context of humans but are unlikely to be attributed more strongly to ingroup
61 than outgroup members.

62 Recent experimental work from Enock and colleagues (2021) supports
63 Over's critique, presenting an empirical challenge to the dual model of
64 dehumanization (Haslam, 2006). Enock et al. (2021) first established that people
65 tend to associate undesirable characteristics as well as desirable ones with humans,
66 confirming an omission from the dual model. Subsequently, seven experiments
67 tested the predictions of the dual model directly against a social preference account
68 in three distinct intergroup contexts - political opponents, immigrants and criminals.
69 Results showed no evidence for dehumanization when undesirable as well as
70 desirable human traits were included in the stimuli. Rather, in line with the social
71 preference account, desirable traits were ascribed more strongly to ingroup
72 members than outgroup members and undesirable traits more strongly to outgroup

73 members than ingroup members, irrespective of perceived humanness (Enock et
74 al., 2021).

75 Perhaps the most prominent psychological model of dehumanization is
76 infrahumanization theory (Leyens et al., 2000, 2001). This theory is distinct from the
77 dual model in that it proposes outgroup members are denied uniquely human
78 emotions rather than character traits. The model is founded on the widespread
79 notion that there is a distinction between secondary emotions (such as pride and
80 guilt) and primary emotions (such as happiness and anger). The former are
81 considered unique to humans, the latter shared with other animals (Demoulin et al.,
82 2004; Ekman, 1992; Leyens et al., 2000). Seminal work has found that when
83 choosing emotions to best describe different groups, people preferentially ascribe
84 uniquely human emotions more strongly to ingroup members (Leyens et al., 2001).
85 For example, across a range of social contexts, participants ascribed uniquely
86 human emotions such as hope, compassion, pride, melancholy, disappointment and
87 remorse, to ingroup members to a greater extent than to outgroup members (Banton
88 et al., 2020; Cortes et al., 2005; Leyens et al., 2001; Paladino et al., 2002; Prati et
89 al., 2016)

90 Infrahumanization research has proliferated in recent years (Leyens, 2009;
91 Vaes et al., 2012). Effects have been reported across explicit and implicit measures
92 (Boccatto et al., 2007; Paladino et al., 2002), and a multitude of intergroup contexts,
93 including regional, religious and racial identities (Banton et al., 2020; Rodríguez-
94 Pérez et al., 2011), university affiliations (Vaes et al., 2003) and minimal groups
95 (Demoulin et al., 2009; Simon & Gutsell, 2020). The importance of the model is
96 highlighted by the use of infrahumanization as an outcome measure in interventions

97 to improve intergroup relations (Brown et al., 2007; Capozza et al., 2013; Prati et al.,
98 2016; Tam et al., 2007).

99 Of key importance to infrahumanization theory is the claim that subtle
100 dehumanization is distinct from intergroup preference because participants ascribe
101 both positive (e.g., hope, admiration) and negative (e.g., guilt, remorse) uniquely
102 human emotions more strongly to the ingroup than the outgroup (Leyens et al.,
103 2000, 2001). That the effect is observed for negative human emotions is claimed to
104 be crucial for separating infrahumanization from intergroup preference. According to
105 infrahumanization theory, the process of perceiving others as lacking *negative*
106 human emotions shows a subtle form of dehumanization that is separate from
107 derogation because here, 'humanness' is different from 'good' (Castano & Giner-
108 Sorolla, 2006; Haslam & Loughnan, 2014; Haslam & Stratemeyer, 2016). As Leyens
109 and colleagues (2000, p.189) note in their original hypotheses:

110 *People should more easily associate their ingroup than an outgroup with*
111 *secondary emotions. This preferential association should be true*
112 *independent of the valence of the secondary emotions. Indeed, it is the*
113 *category of secondary emotions as such that is considered typically human.*
114 *No qualification is made for positive or negative secondary emotions.*

115 Explaining this further, Leyens and colleagues (2001, p. 398) argue:

116 *If the attribution of secondary emotions to the ingroup reflected a mere*
117 *positivity effect, it would lose its interest and originality... would people also*
118 *select more negative secondary emotions for their ingroup than for the*
119 *outgroup? A positive answer... would get rid of a simple positivity bias in the*
120 *case of secondary emotions.*

121 In their original studies, Leyens et al. (2001) included valence
122 (positive/negative) as a factor in their analysis. They found that more secondary
123 emotions were attributed to the ingroup than the outgroup and that this effect was
124 not qualified by the valence of the emotions (see Leyens et al., 2001, p. 402, Fig. 2).
125 Subsequent work from Cortes and colleagues (2005) demonstrated similar effects,
126 showing more positive (e.g., contentment, delight) and negative (e.g., melancholy,
127 resignation) uniquely human emotions to be ascribed to the ingroup than the
128 outgroup, again not qualified by emotion valence (see Cortes et al., 2005, p. 247,
129 Figure 1). Convergent evidence is provided by research that treats and valence and
130 humanness as continuous factors (Castano & Gina-Sorolla, 2006) and by research
131 that has measured the attribution of positive (e.g., amazement, compassion) and
132 negative (e.g., despair, guilt) emotions in separate experiments (Paladino et al.,
133 2002).

134 Owing to the inclusion of negative as well as positive emotions in
135 infrahumanization research, the theory thus appears to be immune to Over's
136 (2020a; 2020b) critique. However, we reconsider infrahumanization theory through a
137 framework that understands emotions as social as well as individual experiences
138 (Parkinson, 1996). Some emotions are by definition positive to experience but are
139 somewhat unkind to others (e.g., schadenfreude), while some may be negative to
140 experience but are not inherently unkind to others (e.g., disappointment). We
141 suggest that although emotions such as guilt and remorse are negative to
142 experience, they are not necessarily antisocial in character. Rather, they indicate
143 appropriate responses to moral wrong-doing and thus people who display them are
144 viewed positively (Stearns & Parrott, 2012). Understanding emotion as a social

145 phenomenon raises the conceptual distinction between valence (positive or negative
146 to experience) and sociality (prosocial or antisocial as viewed by others).

147 To our knowledge, no work has yet measured whether previously reported
148 infrahumanization effects are independent of emotion sociality. Terms frequently
149 included as exemplars of negative uniquely human emotions in infrahumanization
150 work such as melancholy, guilt and remorse, may be negative to experience, but are
151 not obviously antisocial. This omission makes it impossible to determine whether
152 infrahumanization really is separable from ingroup preference and thus whether it
153 holds unique explanatory value in intergroup relations.

154 Twenty years since infrahumanization theory was proposed, we revisit and
155 test its founding claims in thirteen pre-registered, highly powered experiments. In
156 our first six experiments (Study 1) we show that previously reported
157 infrahumanization effects broadly replicate across multiple intergroup contexts. In
158 six subsequent experiments (Study 2), we remove the confound in previous
159 research by introducing emotions that differ in sociality rather than valence. In line
160 with the social preference account, we show that apparent evidence for
161 infrahumanization is better explained by ingroup preference and stereotyping. In a
162 final experiment (Study 3), we provide further evidence for the social preference
163 account by replicating the pattern of results observed in Study 2 in a minimal group
164 design.

165 In Studies 1 and 2, we use the same six intergroup contexts. The precise
166 social conditions necessary for infrahumanization have not been clearly established
167 within the field and it has been noted that it may not always occur (e.g., Castano &
168 Giner-Sorolla, 2006; Demoulin et al., 2009). However, a comprehensive review of

169 prior empirical evidence suggests that outgroups are particularly likely to be
170 infrahumanized if they threaten one's worldview, are disliked, and belong to a social
171 category that one would not want to belong to (Leyens, 2009). Initial
172 infrahumanization studies included students from the Canary Islands versus those
173 from mainland Spain as the intergroup context (Leyens et al., 2000, 2001). The
174 researchers noted general hostility between these groups, with each seeing the
175 other as a 'disliked' outgroup, suggesting 'outgroup derogation' was likely (Leyens et
176 al., 2001, pp. 396–399). Follow-up work included Spanish or Belgian ingroup
177 members and North African individuals as outgroup members, at the time a 'very
178 stigmatized minority and low-status group in Belgium and in the Canary Islands'
179 (Paladino et al., 2002, p. 113). Most infrahumanization studies focus on social
180 contexts that are similarly grounded in antagonism (e.g., Banton et al., 2020; Gaunt,
181 2009).

182 We chose our groups to maximise our chances of replicating
183 infrahumanization effects if they occur (Leyens, 2009). The first outgroup we chose
184 was Muslims (Christian ingroup) (Expts. 1a&2a). Dehumanization of religious
185 outgroups, including of Muslims by Christians, has been widely reported (Banton et
186 al., 2020; Kteily et al., 2016; Viki et al., 2013) and discrimination against Muslims is
187 a pressing social problem in many Western societies (Calfano, 2018; Hewstone &
188 Schmid, 2014). The remaining outgroups were criminals (Expts. 1b&2b), child
189 molesters (Expts. 1c&2c), anti-vaxxers (Expts. 1d&2d), people who do not adhere to
190 social distancing regulations during the Covid-19 pandemic ('non-social distancers')
191 (Expts. 1e&2e), and climate change deniers (Expts. 1f&2f). Prior work reports
192 dehumanization of criminals and sex offenders (Bastian et al., 2013; Viki et al.,

193 2012). We introduced the three additional outgroup contexts (anti-vaxxers, non-
194 social distancers and climate change deniers) based on current pertinence. At the
195 time of data collection in early April 2020, the UK had been in full 'lockdown' for just
196 over one week and tension between individuals who did and did not adhere to the
197 guidelines was developing (Prosser et al., 2020). Similarly, social division between
198 those who are pro- and anti-vaccination has been particularly salient during the
199 COVID-19 pandemic (Johnson et al., 2020). Rather than seeking to be exhaustive,
200 the intergroup contexts we chose for Studies 1 and 2 illustrate the conceptual
201 distinction between infrahumanization theory and our alternative social preference
202 account. In Study 3, we replicated our results in a minimal group design. This
203 allowed us to further demonstrate the generalisability of our results in a social
204 context free from prior stereotypes and intergroup antagonism.

205

206 **2. Data collection and availability**

207 All experiments reported in this manuscript took place online and were created and
208 administered using Qualtrics (<https://www.qualtrics.com>). Participants were recruited
209 through Prolific (<https://www.prolific.co>) and a different sample was included for
210 each experiment reported. Informed consent was obtained at the start of each
211 session according to approved ethical procedures. Participants were compensated
212 at an approximate rate of £7.50 per hour. All studies were pre-registered and the
213 data is available open access. Links to pre-registration documents and raw data for
214 each study can be found at: <https://osf.io/rzb3n/>

215

216

217 **3. Pretest**

218 One concern with prior work is that there are inconsistencies in how emotions are
219 categorised; whether or not items are considered uniquely human changes between
220 studies. For example, 'enjoyment' is considered uniquely human whereas 'joy' is not
221 (Leyens et al., 2001; Paladino et al., 2002). 'Happiness' is sometimes considered
222 uniquely human (Paladino et al., 2002) but sometimes not (Cortes et al., 2005).
223 These problems may arise because previous studies have not rigorously pretested
224 the emotion terms they used as stimuli as well as from translational discrepancies
225 across studies conducted in different languages. In order to formally determine
226 which emotions (In English) tend to be considered uniquely human and which tend
227 to be considered shared with other animals, we conducted a pretest in which we
228 asked participants to rate fifty-four common emotion terms on three scales: human
229 uniqueness, valence of experience and sociality.

230 **3.1. Pretest Methods**

231 **3.1.1. Participants**

232 Sixty participants completed the ratings (22 female, 37 male, 1 'other'), aged
233 between 18 and 54 (Mean age=26.8, $SD=7.98$). All participants were fluent in
234 English. Eight people failed one or more attention checks and their data was
235 excluded and replaced.

236 **3.1.2. Scales**

237 We chose fifty-four common emotion terms and asked participants to rate them on
238 Humanness (the extent to which it is believed each emotion is experienced by
239 humans compared to other species), Valence (the extent to which it is believed each
240 emotion is positive or negative to experience) and Sociality (the extent to which it is

241 believed each emotion is prosocial or antisocial), using three separate sliding
242 scales. The full list of emotion terms, along with additional information about scale
243 presentation, is in supplementary information.

244 **3.1.3. Procedure**

245 Participants were informed that the study would examine the ways in which people
246 understand emotional terms and that they would be asked to rate emotion words on
247 the three separate scales. Once informed consent was obtained, brief demographic
248 and screening questions were asked. Then, participants were taken through the
249 three question blocks. Participants were debriefed and redirected back to Prolific for
250 payment. The session took approximately twelve minutes.

251 **3.2. Pretest results and discussion**

252 Our pretest confirmed that emotions differ both in valence and sociality. We present
253 the mean ratings for each emotion on Humanness, Valence and Sociality in
254 supplementary information, Table S1. The 'basic' (or 'primary') emotions such as
255 fear, sadness, happiness and surprise featured among the emotions most thought
256 of as shared with other species (Ekman, 1992). In line with infrahumanization
257 theory, we largely replicated prior work from Demoulin et al. (2004), who also
258 reported emotions such as nostalgia and optimism to be most uniquely human, and
259 emotions such as fear and surprise to be least uniquely human. Importantly,
260 however, none of the terms commonly included as negative secondary emotions in
261 previous research, such as guilt, remorse, resignation and melancholy (Leyens et
262 al., 2001; Paladino et al., 2002) were perceived to be antisocial, even though they
263 were considered negative to experience.

264 Overall, there was a general positive association between mean scores
265 across participants for valence and sociality. This suggests that, across a broad
266 range of emotion terms, emotions that make us feel positive are also viewed as
267 prosocial and emotions that make us feel negative may be viewed as more
268 antisocial. However, for the specific negative emotions commonly included in prior
269 infrahumanization work, participants' scores on valence and sociality scales were
270 not strongly (if at all) associated. For example, correlations were $r(58) = .131$, $p =$
271 $.318$ for regret, $r(58) = .187$, $p = .153$ for melancholy, $r(58) = .262$, $p = .035$ for
272 disillusion, and $r(58) = .060$, $p = .651$ for remorse. This shows that the kinds of
273 negative emotions that infrahumanization researchers have included in previous
274 research (e.g., regret, melancholy, disillusion, remorse - Banton et al., 2020; Leyens
275 et al., 2001; Paladino et al., 2002; Vaes et al., 2003) may be negative to experience
276 but are not antisocial and so are not best placed to determine whether
277 infrahumanization is separate from intergroup preference. This provides strong
278 grounds for re-examining the nature of intergroup bias in emotion attribution.

279

280 **4. Study 1: Replicating previous research**

281 In our first six experiments we sought to replicate previous research. Participants
282 rated how strongly they believed ingroup and outgroup members to experience
283 sixteen emotions. Four emotions were unique to humans and positive (nostalgia,
284 optimism, humility, hope), four were unique to humans and negative, (disillusion,
285 regret, melancholy, remorse) four were shared with other animals and positive,
286 (happiness, tenderness, surprise, love) and four were shared with other animals and
287 negative (fear, loneliness, sadness, nervousness).

288 **4.1. Study 1 Methods**

289 4.1.1. Participants

290 A power analysis using MorePower 6.0.4 found a minimum N of 126 to be
291 necessary to detect interactions with a medium effect size (partial eta squared .06)
292 with an alpha of .05 and power of .8. 130 different participants completed the ratings
293 in each experiment. Participants were only eligible if they were 18 or over, fluent in
294 English and had not taken part in any of the other experiments reported. Data
295 collection for each experiment took place completely separately. We excluded and
296 replaced any participants that failed one or more of the attention checks.

297 In **Experiment 1a** (Muslim outgroup), participants could only take part if they
298 identified as Christian. Seven people failed one or more attention check. Of the final
299 sample, 95 participants were female and 35 were male, aged from 18 to 68 (Mean
300 age = 35.3, *SD* = 14.07).

301 In **Experiment 1b** (criminal outgroup), participants could only take part if they
302 had not served previous prison sentences. Five people failed one or more attention
303 check. Of the final sample, 58 participants were female, 70 were male, 1 was
304 nonbinary and 1 indicated 'prefer not to say'. Ages ranged from 18 to 59 (Mean age
305 = 27.1, *SD* = 7.94).

306 In **Experiment 1c** (child molester outgroup), four people failed one or more
307 attention check. Of the final sample, 84 participants were female, 46 were male, and
308 ages ranged from 18 to 57 (Mean age = 28.5, *SD* = 10.66).

309 In **Experiment 1d** (anti-vaxxer outgroup), participants could only take part if
310 they were pro vaccination. Four people failed one or more attention check and three
311 additional people were excluded because they indicated they were anti vaccination.

312 Of the final sample, 53 participants were female, 75 were male and 2 were non-
313 binary/agender, aged from 18 to 60 (Mean age = 27.0, *SD* = 8.92).

314 In **Experiment 1e** (non-social distancer outgroup), participants could only
315 take part if they were living in the UK and reported that they were following current
316 social distancing regulations. Three people were excluded because they indicated
317 that they were not adhering to social distancing regulations and their data was
318 excluded and replaced. Of the final sample, 95 participants were female and 35
319 were male, aged from 18 to 68 (Mean age = 35.3, *SD* = 14.07).

320 In **Experiment 1f** (climate change deniers as outgroup), participants could
321 only take part if they believed in climate change. Five people failed one or more
322 attention check. Of the final sample, 52 participants were female, 78 were male and
323 ages ranged from 18 to 62 (Mean age = 26.6, *SD* = 9.22).

324 **4.1.2. Stimuli development**

325 We chose emotions from our pretest data (supplementary information, Table S1)
326 that best fit the four emotion categories of interest: unique to humans and positive,
327 unique to humans and negative, shared with other animals and positive and shared
328 with other animals and negative. Table 1 shows the list of emotion words included in
329 the final stimulus sets. From the most and least uniquely human terms, we chose
330 four rated as highly positive and four rated as highly negative. In developing the
331 items for our emotion categories, we ensured that humanness ratings were closely
332 matched between the positive and negative conditions for each level of humanness
333 so that we could accurately separate valence effects from ones of humanness. See
334 supplementary information for further details on stimuli development.

335

336 **Table 1.** Emotion terms included for each condition in all experiments

	Study 1		Study 2	
	Positive	Negative	Prosocial	Antisocial
Unique to humans	Nostalgia	Disillusion	Nostalgia	Arrogance
	Optimism	Regret	Optimism	Schadenfreude
	Humility	Melancholy	Humility	Contempt
	Hope	Remorse	Hope	Scorn
Shared with other animals	Happiness	Fear	Happiness	Hostility
	Tenderness	Loneliness	Tenderness	Irritation
	Surprise	Sadness	Love	Anger
	Love	Nervousness	Friendliness	Disgust

337

338 4.1.3. Scales

339 Participants indicated on unmarked sliders how strongly they thought the ingroup
 340 and outgroup in each experiment experienced the sixteen emotions from *Not at all*
 341 (0) to *Very strongly* (100), with the midpoint *Somewhat* (50). For example, in
 342 Experiment 1b, the outgroup block began ‘In the following questions, please
 343 consider the group: **Individuals with criminal convictions**’. Then, participants
 344 would respond to each item, such as ‘How strongly do you think a typical criminal
 345 feels **nostalgia**’. Ingroup and outgroup items were presented in two separate blocks
 346 shown on sequential screens, the order of which was counterbalanced across
 347 participants. The sixteen emotion items within each block were randomised and one
 348 attention check per block was also included approximately halfway through, such as
 349 ‘Please indicate *Somewhat*’.

350 Participants also completed the blatant dehumanization scale (Kteily et al.,
 351 2015) (Figure 1) and a simple preference measure for both groups. In the blatant
 352 dehumanization scale, participants saw the ‘ascent of man’ image and were asked
 353 to indicate on an unmarked slider how evolved they considered the average

354 member of each group to be, with 0 corresponding to the very bottom and 100 to the
355 most human at the very top. In the attitude scale, participants were asked to indicate
356 how they felt about each group using an unmarked sliding scale from *Extremely*
357 *Negative* (0) to *Extremely Positive* (100). For all scales, half of the participants
358 responded to ingroup items first and half to outgroup items first.

359 We included the group preference and blatant dehumanization measures to
360 check that our chosen groups were the kinds that we should expect to see
361 infrahumanized should the process occur. Prior work shows that infrahumanization
362 measures correlate positively with blatant dehumanization scores (Kteily et al.,
363 2015). Thus, though they are not claimed to measure the same construct, they have
364 been shown to reliably co-occur. We included the attitude measure as confirmation
365 that the outgroups were social categories that participants ‘would not like or want to
366 belong to’ (Leyens, 2009), also increasing chances of detecting infrahumanization if
367 it occurs.

368 **4.1.4. Procedure**

369 Participants were informed that the study was designed to help us understand the
370 ways in which people ascribe emotions to different groups of individuals and stated
371 the particular groups of interest for each experiment. Participants were instructed
372 that they would be asked to rate sixteen emotion words on two scales, one for each
373 social category, and then complete two scales asking about attitudes to each group.
374 Once informed consent was obtained, brief demographic and screening (if relevant)
375 questions were asked. Then, participants were taken through the two experimental
376 blocks. Following this, participants completed the group preference and then the

377 blatant dehumanization scales. Lastly, participants were debriefed and redirected
378 back to Prolific for payment. On average, the sessions took under ten minutes.

379 **4.1.5. Design and data analysis**

380 In line with our pre-registered analysis plan, we conducted 2 (Group:
381 ingroup/outgroup) x 2 (Valence: positive/negative) x 2 (Humanness: unique to
382 humans / shared with other animals) within subjects ANOVAs to test for
383 infrahumanization in intergroup emotion attributions. Scores for each emotion
384 category were obtained by calculating the mean of the four emotion terms within the
385 category for each participant. For example, a participant's score for uniquely human
386 positive emotion ascriptions towards the ingroup would be the mean of their ratings
387 on Nostalgia, Optimism, Humility and Hope within the ingroup block. More detail
388 about the design is available in supplementary information.

389 In this design, infrahumanization would be observed in an interaction
390 whereby uniquely human emotions are more strongly ascribed to the ingroup,
391 independent of valence (Leyens et al., 2000). This should not be the case for
392 emotions shared with other animals, for which previous work found the reverse or
393 no difference (Leyens et al., 2001). For example, in original experiments
394 demonstrating infrahumanization, Leyens and colleagues (2001) showed that more
395 positive and negative uniquely human emotions were attributed to the ingroup than
396 the outgroup and that this was not qualified by an interaction with valence (see
397 Leyens et al., 2001, p. 402, Fig. 2).

398 Though previous studies do not find interactions between intergroup emotion
399 attributions and valence, there tend to be main effects of valence such that
400 ascriptions of positive emotions are generally higher than negative ones. These

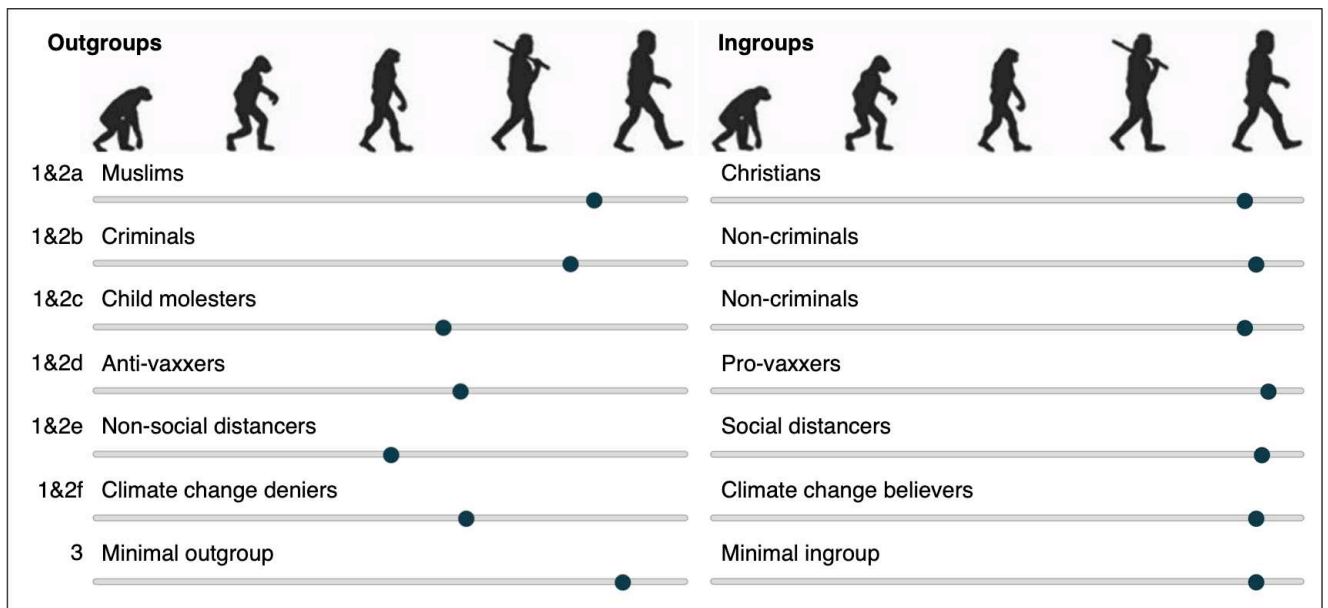
401 results are not central to the predictions of infrahumanization theory nor the social
402 preference account.

403 In following up significant interactions, we report only comparisons between
404 ingroup and outgroup ratings for each condition, in line with testing the main
405 hypotheses. We measured differences in ratings for ingroup and outgroup on the
406 attitude and ‘blatant dehumanization’ scales using paired-samples t-tests. All tests
407 were two-sided and met the assumptions necessary for our statistical approaches.

408 **4.2. Study 1 Results**

409 **4.2.1. Blatant dehumanization and attitude scores**

410 In every experiment, the outgroup was rated as significantly less human than the
411 ingroup on the blatant dehumanization scale (all $ps < .001$). Additionally, participants
412 reported feeling significantly more negative towards the outgroup than the ingroup
413 on the attitude scale (all $ps < .001$). Figure 1 shows the points at which outgroups and
414 ingroups were marked on the blatant dehumanization scale. The extent to which
415 outgroups were ‘blatantly dehumanized’ varied greatly across our intergroup
416 contexts. The average point at which Muslims and ‘criminals’ were marked fell
417 between the most ‘evolved’ looking human silhouette and the more caveman-like
418 silhouette next to it on the scale. ‘Child molesters’ and ‘non-social distancers’ were
419 rated much further down on the ascent scale, nearer to the midway point between
420 the ape-like and modern human-like depictions. Figure S1 (supplementary
421 information) shows mean results for each ingroup and outgroup on the
422 dehumanization and attitude measures.



423

424 **Figure 1. The average points at which outgroups and ingroups were marked**

425 **on the blatant dehumanization scale across Studies 1, 2 and 3. All outgroups**

426 **were significantly dehumanized relative to the corresponding ingroup (all $p < .001$ in**

427 **Studies 1 & 2, $p = .002$ in Study 3).**

428

429 **4.2.2. Intergroup emotion ascriptions**

430 **4.2.2.1. Experiment 1a**

431 For ratings towards Muslims (outgroup) and Christians (ingroup), there were

432 significant main effects of group, $F(1, 129) = 32.54, p < .001, \eta_p^2 = .201$, and of

433 valence, $F(1, 129) = 101.80, p < .001, \eta_p^2 = .441$, with ratings higher overall for

434 ingroup than outgroup and for positive than negative emotions. There was no

435 significant main effect of humanness, $F(1, 129) = .76, p = .384, \eta_p^2 = .006$.

436 There were significant interactions between group and humanness, $F(1, 129)$

437 $= 11.89, p = .001, \eta_p^2 = .084$, group and valence, $F(1, 129) = 17.16, p < .001, \eta_p^2 =$

438 $.117$, and humanness and valence, $F(1, 129) = 11.77, p = .001, \eta_p^2 = .084$. Pairwise

439 comparisons showed that overall, ratings were higher for ingroup than outgroup

440 both for uniquely human emotions ($p < .001$) and for emotions shared with other
441 animals ($p = .001$). Ratings were overall higher for ingroup than outgroup for positive
442 emotions ($p < .001$), but there were no differences between groups for negative
443 emotions ($p = .463$).

444 All effects were qualified in a significant three-way interaction, $F(1, 129) =$
445 $11.37, p = .001, \eta_p^2 = .081$. Planned comparisons showed that ratings were higher for
446 ingroup than outgroup for positive uniquely human terms ($p < .001$), negative
447 uniquely human terms ($p = .006$), and positive terms shared with other animals (p
448 $< .001$). However, there was no difference between ingroup and outgroup for
449 negative terms shared with other animals ($p = .104$).

450 **4.2.2.2. Experiment 1b**

451 For ratings towards Criminals (outgroup) and 'individuals with no criminal history'
452 (ingroup), there were significant main effects of group, $F(1, 129) = 31.84, p < .001,$
453 $\eta_p^2 = .198$, valence, $F(1, 129) = 4.64, p = .033, \eta_p^2 = .035$, and humanness, $F(1, 129)$
454 $= 35.86, p < .001, \eta_p^2 = .218$. Ratings were higher overall for ingroup than outgroup,
455 for negative than positive emotions, and for emotions shared with other animals
456 than for uniquely human emotions.

457 There were significant interactions between group and humanness, $F(1, 129)$
458 $= 7.62, p = .007, \eta_p^2 = .056$, group and valence, $F(1, 129) = 167.70, p < .001, \eta_p^2 =$
459 $.565$, and humanness and valence, $F(1, 129) = 4.16, p = .043, \eta_p^2 = .031$. Pairwise
460 comparisons showed that overall, ratings were higher for ingroup than outgroup
461 both for uniquely human emotions and for emotions shared with other animals ($p <$
462 $.001$). Ratings were overall higher for ingroup than outgroup for positive emotions
463 ($p < .001$), and higher for outgroup than ingroup for negative emotions ($p = .006$).

464 All effects were qualified in a significant three-way interaction, $F(1, 129) =$
465 $4.56, p = .035, \eta_p^2 = .034$. Planned comparisons showed that ratings were higher for
466 ingroup than outgroup for positive terms, both uniquely human and shared with
467 other animals ($ps < .001$), but higher for outgroup than ingroup on negative terms,
468 both uniquely human ($p = .007$) and shared with other animals ($p = .020$).

469 **4.2.2.3. Experiment 1c**

470 For ratings towards 'child molesters' (outgroup) and 'individuals with no criminal
471 history' (ingroup), there were significant main effects of group, $F(1, 129) = 154.31, p$
472 $< .001, \eta_p^2 = .545$, and of humanness, $F(1, 129) = 83.51, p < .001, \eta_p^2 = .393$, but not
473 of valence, $F(1, 129) = 2.97, p = .087, \eta_p^2 = .023$. Ratings were higher overall for
474 ingroup than outgroup and for emotions shared with other animals than for uniquely
475 human emotions.

476 There were significant interactions between group and humanness, $F(1, 129)$
477 $= 17.70, p < .001, \eta_p^2 = .121$, group and valence, $F(1, 129) = 119.32, p < .001, \eta_p^2 =$
478 $.481$, and humanness and valence, $F(1, 129) = 28.98, p < .001, \eta_p^2 = .189$. Pairwise
479 comparisons showed that overall, ratings were higher for ingroup than outgroup
480 both for uniquely human emotions and for emotions shared with other animals ($ps <$
481 $.001$). Ratings were also overall higher for ingroup than outgroup for positive
482 emotions ($p < .001$), and for negative emotions ($p = .001$).

483 All effects were qualified in a significant three-way interaction, $F(1, 129) =$
484 $14.10, p < .001, \eta_p^2 = .099$. Planned comparisons showed that ratings were higher for
485 ingroup than outgroup for positive uniquely human terms ($p < .001$), negative
486 uniquely human terms ($p < .001$), and positive terms shared with other animals (p

487 <.001). However, there was no difference between ingroup and outgroup for
488 negative terms shared with other animals ($p = .287$).

489 **4.2.2.4. Experiment 1d**

490 For ratings towards 'anti-vaxxers' (outgroup) and 'pro-vaxxers' (ingroup), there were
491 significant main effects of humanness, $F(1, 129) = 40.42, p <.001, \eta_p^2 = .239$, and of
492 valence, $F(1, 129) = 69.59, p <.001, \eta_p^2 = .350$, but not of group, $F(1, 129) = 1.02, p$
493 $= .315, \eta_p^2 = .008$. Ratings were higher overall emotions shared with other animals
494 than for uniquely human emotions and for positive than negative emotions.

495 There were significant interactions between Group and Valence, $F(1, 129) =$
496 $88.99, p <.001, \eta_p^2 = .408$, Group and Humanness, $F(1, 129) = 11.49, p = .001, \eta_p^2 =$
497 $.082$, and Valence and Humanness, $F(1, 129) = 8.41, p = .004, \eta_p^2 = .061$. Pairwise
498 comparisons showed that overall, ratings were higher for ingroup than outgroup for
499 uniquely human emotions ($p = .017$) but not for emotions shared with other animals
500 ($p < .358$). Ratings were overall higher for ingroup than outgroup for positive
501 emotions ($p <.001$) but higher for outgroup than ingroup for negative emotions ($p =$
502 $.001$). The three-way interaction was not significant, $F(1, 129) = .31, p = .580, \eta_p^2 =$
503 $.002$.

504 **4.2.2.5. Experiment 1e**

505 For ratings towards 'non-social distancers' (outgroup) and 'social distancers'
506 (ingroup), there were significant main effects of group, $F(1, 129) = 239.50, p <.001,$
507 $\eta_p^2 = .650$, and of humanness, $F(1, 129) = 60.13, p <.001, \eta_p^2 = .318$, but not of
508 valence, $F(1, 129) = 1.75, p = .188, \eta_p^2 = .013$. Ratings were higher overall for
509 ingroup than outgroup and for emotions shared with other animals than for uniquely
510 human emotions.

511 There were significant interactions between group and humanness, $F(1, 129)$
512 = 38.46, $p < .001$, $\eta_p^2 = .230$, group and valence, $F(1, 129) = 16.08$, $p < .001$, $\eta_p^2 =$
513 .111, and humanness and valence, $F(1, 129) = 113.12$, $p < .001$, $\eta_p^2 = .467$. Pairwise
514 comparisons showed that overall, ratings were higher for ingroup than outgroup
515 both for uniquely human emotions and for emotions shared with other animals ($ps <$
516 .001). Ratings were also overall higher for ingroup than outgroup for positive
517 emotions ($p < .001$), and for negative emotions ($p = .001$).

518 All effects were qualified in a significant three-way interaction, $F(1, 129) =$
519 149.18, $p < .001$, $\eta_p^2 = .536$. Planned comparisons showed that ratings were higher
520 for ingroup than outgroup for all four emotion conditions - positive uniquely human
521 terms, negative uniquely human terms, positive terms shared with other animals and
522 negative terms shared with other animals (all $ps < .001$).

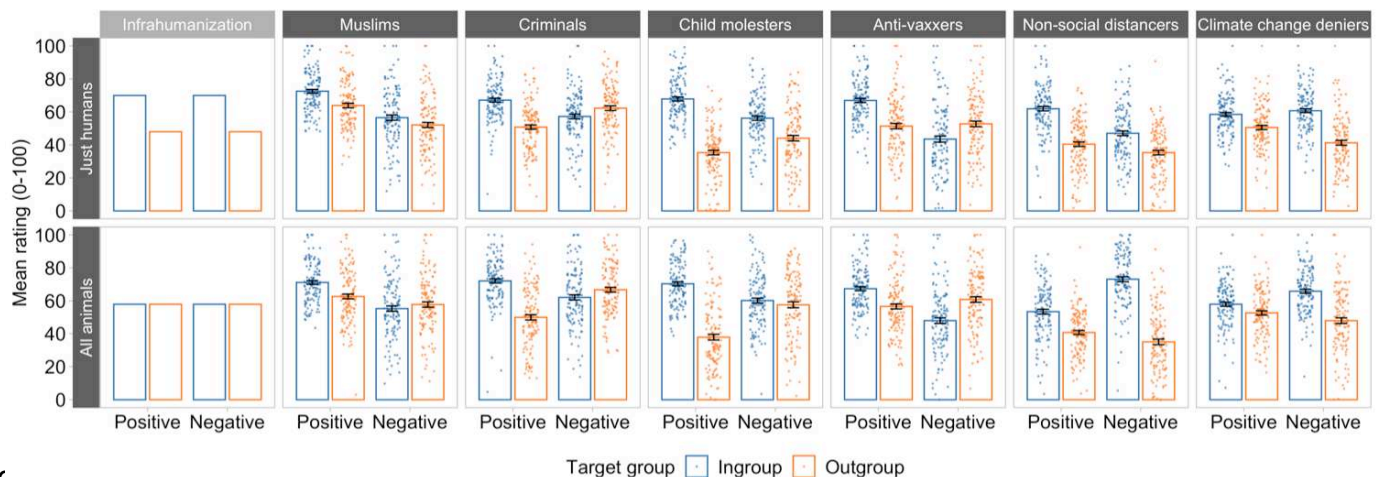
523 **4.2.2.6. Experiment 1f**

524 For 'climate change deniers' (outgroup) and 'climate change believers' (ingroup),
525 there were significant main effects of group, $F(1, 129) = 171.51$, $p < .001$, $\eta_p^2 = .571$,
526 and of humanness, $F(1, 129) = 27.79$, $p < .001$, $\eta_p^2 = .177$, but not of valence, $F(1,$
527 129) = .85, $p = .359$, $\eta_p^2 = .007$. Ratings were higher overall for ingroup than outgroup
528 and for emotions shared with other animals than for uniquely human emotions.

529 There were significant interactions between group and humanness, $F(1, 129)$
530 = 3.92, $p = .05$, $\eta_p^2 = .029$, group and valence, $F(1, 129) = 38.99$, $p < .001$, $\eta_p^2 = .232$,
531 and humanness and valence, $F(1, 129) = 17.02$, $p < .001$, $\eta_p^2 = .117$. Pairwise
532 comparisons showed that overall, ratings were higher for ingroup than outgroup
533 both for uniquely human emotions and for emotions shared with other animals ($ps <$
534 .001). Ratings were also overall higher for ingroup than outgroup for positive

535 emotions and for negative emotions ($ps = .001$). The three-way interaction was not
536 significant, $F(1, 129) = .13, p = .724, \eta_p^2 = .001$.

537 Mean scores (M) and standard errors of the mean (SE) for each of the
538 conditions across all experiments in Study 1 are shown in supplementary
539 information, Table S2. Figure 2 shows results from Study 1.



540

541 **Figure 2. Partial replications of infrahumanization theory.** Some outgroups

542 (Muslims, child molesters, non-social distancers and climate change deniers) were

543 rated overall as experiencing both positive and negative uniquely human emotions

544 to a lesser extent than the ingroup (top panels). These outgroups were also rated as

545 experiencing some emotions shared with other animals to a lesser extent than the

546 ingroup (bottom panels). Note that while main effects of valence have been reported

547 in some prior work (see Leyens et al., 2001, p. 402, Fig. 2), we do not plot these the

548 prediction, as they are not relevant for distinguishing between the theories. Error

549 bars represent standard errors.

550 4.3. Study 1 Discussion

551 Results partially replicated the predictions of infrahumanization theory - some

552 outgroups were rated overall as experiencing both positive and negative uniquely

553 human emotions to a lesser extent than the ingroup. However, these outgroups
554 were also rated as experiencing emotions shared with other animals to a lesser
555 extent than the ingroup. In each experiment, the outgroup was rated as 'less human'
556 on the blatant dehumanization scale, confirming that these were the types of
557 intergroup contexts in which we ought to see infrahumanization effects should the
558 process occur. We next examined whether controlling for the sociality of emotional
559 terms explained apparent evidence for infrahumanization.

560

561 **5. Study 2: Testing the social preference account**

562 In our next six experiments, we test whether what appears to be infrahumanization
563 may be explained by ingroup preference and stereotyping. Rather than comparing
564 intergroup ascriptions of emotions that varied by how positive or negative they are to
565 experience, we compared ascriptions of emotions that varied by how prosocial or
566 antisocial they are in character. Participants rated the same six groups on four types
567 of emotional experience: unique to humans and prosocial (nostalgia, optimism,
568 humility, hope), unique to humans and antisocial (arrogance, schadenfreude,
569 contempt, scorn), shared with other animals and prosocial (happiness, tenderness,
570 love, friendliness) and shared with other animals and antisocial (hostility, irritation,
571 anger, disgust).

572 This design pits the predictions of infrahumanization against a social
573 preference account. Infrahumanization would be observed in an interaction between
574 Group and Humanness such that uniquely human emotions will be more strongly
575 ascribed to ingroup than outgroup, both for prosocial and antisocial emotions (i.e.,
576 Leyens et al., 2001, p. 402, Fig. 2). In contrast, we hypothesised that prosocial

577 emotions will typically be attributed more strongly to the ingroup and antisocial ones
578 to the outgroup, regardless of humanness (Figure 3 shows both predictions).

579 **5.1. Study 2 Methods**

580 **5.1.1. Participants**

581 Based on the same power analysis as reported for Study 1, 130 different
582 participants completed the ratings in each experiment. The same eligibility criteria
583 were applied as for Study 1.

584 For **Experiment 2a** (Muslim outgroup), participants could only take part if
585 they identified as Christian. Six people failed one or more attention check. Of the
586 final sample, 86 participants were female, 42 male and 2 were non-binary/agender,
587 aged from 18 to 71 (Mean age = 33.6, $SD = 11.79$).

588 For **Experiment 2b** (criminal outgroup), participants could only take part if
589 they had not served previous prison sentences. One person failed one or more
590 attention check. Of the final sample, 62 participants were female, 68 were male and
591 ages ranged from 18 to 65 (Mean age = 26.9, $SD = 8.65$).

592 For **Experiment 2c** (child molester outgroup), three people failed one or
593 more attention check. Of the final sample, 87 were female, 42 male and 1 non-
594 binary, with an age range of 18 to 61 (Mean age = 31.6, $SD = 10.14$).

595 In **Experiment 2d** (anti-vaxxer outgroup), participants could only take part if
596 they were pro-vaccination. Seven people failed one or more attention check and four
597 additional people were excluded because they indicated that they were anti
598 vaccination. Of the final sample, 50 were female and 80 were male, aged from 18 to
599 51 (Mean age = 25.9, $SD = 8.01$).

600 In **Experiment 2e** (non-social distancers outgroup), participants could only
601 take part if they were living in the UK and following social distancing regulations.
602 Data was excluded and replaced for three participants who failed one or more
603 attention check and one additional participant who indicated that they were not
604 adhering to social distancing regulations. Of the final sample, 86 were female, 42
605 were male and 2 were non-binary/agender, aged from 18 to 71 (Mean age = 33.6,
606 $SD = 11.79$).

607 For **Experiment 2f** (climate change deniers outgroup), participants could only
608 take part if they believed in climate change. Two people failed one or more attention
609 check. Of the final sample, 53 were female, 76 male and 1 non-binary, with an age
610 range of 18 to 60 (Mean age = 27.3, $SD = 8.36$).

611 **5.1.2. Stimuli development**

612 We chose emotions from our pretest data (supplementary information, Table S1)
613 that best fit the four emotion categories of interest: unique to humans and prosocial,
614 unique to humans and antisocial, shared with other animals and prosocial and
615 shared with other animals and antisocial. From the most and least uniquely human
616 terms, we chose four rated as highly prosocial and four rated as highly antisocial,
617 this time ignoring valence ratings. Table 1 shows the full list of emotion words. We
618 chose the emotions such that humanness ratings were closely matched between
619 the prosocial and antisocial conditions at each level of humanness. This was so that
620 dimensions of Sociality and Humanness were orthogonal, allowing us to accurately
621 separate effects of each. See supplementary information for further details on stimuli
622 development.

623 **5.1.3. Scales**

624 We employed the same six intergroup contexts as for Study 1. Apart from including
625 different emotion items, the emotion attribution scales were identical as to those
626 described for Study 1. Participants again completed the blatant dehumanization
627 scale (Kteily et al., 2015) (Figure 1) and the group preference scale for the ingroup
628 and outgroup in each experiment.

629 **5.1.4. Procedure, design and data analysis**

630 The procedure was the same as outlined for Study 1. The design and data analysis
631 were almost identical as described for Study 1 though with the Sociality
632 (prosocial/antisocial) variable instead of the Valence (positive/negative) variable.

633 **5.2. Study 2 Results**

634 **5.2.1. Blatant dehumanization and attitude scores**

635 The outgroup was always rated as significantly less human than the ingroup on the
636 blatant dehumanization scale (all $ps < .001$). Additionally, participants reported feeling
637 significantly more negative towards the outgroup than the ingroup on the attitude
638 scale (all $ps < .001$) (Figure 1). Figure S1 (supplementary information) shows mean
639 results for each ingroup and outgroup on the dehumanization and attitude
640 measures.

641 **5.2.2. Intergroup emotion ascription ratings**

642 **5.2.2.1. Experiment 2a**

643 For ratings towards Muslims (outgroup) and Christians (ingroup), there were main
644 effects of humanness, $F(1, 129) = 28.75, p < .001, \eta_p^2 = .182$, and of sociality, $F(1,$
645 $129) = 147.39, p < .001, \eta_p^2 = .533$, but not of group, $F(1, 129) = .42, p = .517, \eta_p^2 =$
646 $.003$. Ratings were higher overall for emotions shared with other animals than for
647 uniquely human emotions, and for prosocial than antisocial emotions.

648 There was a significant interaction between group and sociality, $F(1, 129) =$
649 39.45, $p < .001$, $\eta_p^2 = .234$, but not between group and humanness, $F(1, 129) = .75$, p
650 $= .389$, $\eta_p^2 = .006$, nor between humanness and sociality, $F(1, 129) = 1.74$, $p = .190$,
651 $\eta_p^2 = .013$. Pairwise comparisons showed that overall, ratings were higher for
652 ingroup than outgroup for prosocial emotions, but higher for outgroup than ingroup
653 for antisocial emotions ($ps < .001$).

654 All effects were qualified in a significant three-way interaction $F(1, 129) =$
655 3.97, $p = .048$, $\eta_p^2 = .030$. Planned comparisons showed that ratings were higher for
656 ingroup than outgroup on prosocial terms, both uniquely human and shared with
657 other animals ($ps < .001$), and higher for outgroup than ingroup on antisocial terms
658 ($ps < .001$), both uniquely human and shared with other animals.

659 **5.2.2.2. Experiment 2b**

660 For ratings towards 'convicted criminals' (outgroup) and 'individuals with no criminal
661 history' (ingroup), there were main effects of humanness, $F(1, 129) = 40.04$, p
662 $< .001$, $\eta_p^2 = .237$, and of group, $F(1, 129) = 36.63$, $p < .001$, $\eta_p^2 = .221$, but not of
663 sociality, $F(1, 129) < .001$, $p = .996$, $\eta_p^2 < .001$. Ratings were higher overall for
664 emotions shared with other animals than for uniquely human emotions, and for
665 ingroup than outgroup.

666 There was a significant interaction between group and sociality, $F(1, 129) =$
667 201.29, $p < .001$, $\eta_p^2 = .609$, humanness and sociality, $F(1, 129) = 33.63$, $p < .001$,
668 $\eta_p^2 = .207$, but not between group and humanness, $F(1, 129) = .98$, $p = .323$, $\eta_p^2 =$
669 $.008$. Pairwise comparisons showed that overall, ratings were higher for ingroup
670 than outgroup for prosocial emotions, but higher for outgroup than ingroup for
671 antisocial emotions ($ps < .001$).

672 All effects were qualified in a significant three-way interaction, $F(1, 129) =$
673 $24.72, p < .001, \eta_p^2 = .161$. Planned analyses of simple effects following the three-
674 way interaction showed that ratings were higher for ingroup than outgroup on
675 prosocial terms, both uniquely human and shared with other animals ($ps < .001$),
676 and higher for outgroup than ingroup on antisocial terms ($ps < .001$), both uniquely
677 human and shared with other animals.

678 5.2.2.3. Experiment 2c

679 For ratings towards 'child molesters' (outgroup) and 'individuals with no criminal
680 history' (ingroup) on emotion experiences, there were main effects of humanness,
681 $F(1, 129) = 6.81, p = .010, \eta_p^2 = .050$, and of group, $F(1, 129) = 122.42, p < .001, \eta_p^2$
682 $= .487$, and of sociality, $F(1, 129) = 25.01, p < .001, \eta_p^2 = .162$. Ratings were higher
683 overall for emotions shared with other animals than for uniquely human emotions,
684 for ingroup than outgroup, and for antisocial than prosocial emotions.

685 There was a significant interaction between group and sociality, $F(1, 129) =$
686 $201.29, p < .001, \eta_p^2 = .609$, humanness and sociality, $F(1, 129) = 234.42, p < .001,$
687 $\eta_p^2 = .645$, and between group and humanness, $F(1, 129) = 21.82, p < .001, \eta_p^2 =$
688 $.145$. Pairwise comparisons showed that overall, ratings were higher for ingroup
689 than outgroup for prosocial emotions, but higher for outgroup than ingroup for
690 antisocial emotions ($ps < .001$). Though the interaction between group and
691 humanness was significant, this did not reflect the infrahumanization prediction.
692 Ratings were overall higher for ingroup than outgroup both for uniquely human
693 emotions and for emotions shared with other animals. Importantly, ratings were
694 higher for ingroup than outgroup on prosocial terms, both uniquely human and
695 shared with other animals ($ps < .001$), and higher for outgroup than ingroup on

696 antisocial terms, both uniquely human ($p < .001$) and shared with other animals ($p =$
697 $.004$). The three-way interaction was not significant, $F(1, 129) = .28, p = .600, \eta_p^2 =$
698 $.002$.

699 **5.2.2.4. Experiment 2d**

700 For ratings towards 'anti-vaxxers' (outgroup) and 'pro-vaxxers' (ingroup), there was
701 a significant main effect of humanness, $F(1, 129) = 69.28, p < .001, \eta_p^2 = .349$, but
702 not of group, $F(1, 129) = 2.79, p = .097, \eta_p^2 = .021$, nor of sociality, $F(1, 129) = 1.33,$
703 $p = .251, \eta_p^2 = .010$. Ratings were higher overall for emotions shared with other
704 animals than for uniquely human emotions.

705 There was a significant interaction between group and sociality, $F(1, 129) =$
706 $216.29, p < .001, \eta_p^2 = .626$, humanness and sociality, $F(1, 129) = 4.55, p = .035, \eta_p^2 =$
707 $.034$, but not between group and humanness, $F(1, 129) = .08, p = .782, \eta_p^2 = .001$.
708 Pairwise comparisons showed that overall, ratings were higher for ingroup than
709 outgroup for prosocial emotions, but higher for outgroup than ingroup for antisocial
710 emotions ($ps < .001$).

711 All effects were qualified in a significant three-way interaction $F(1, 129) =$
712 $14.83, p < .001, \eta_p^2 = .103$. Planned comparisons showed that ratings were higher for
713 ingroup than outgroup on prosocial terms, both uniquely human and shared with
714 other animals and higher for outgroup than ingroup on antisocial terms both uniquely
715 human and shared with other animals (all $ps < .001$).

716 **5.2.2.5. Experiment 2e**

717 For ratings towards 'non-social distancers' (outgroup) and 'social distancers'
718 (ingroup), there was a significant main effect of humanness, $F(1, 129) = 10.32, p =$
719 $.002, \eta_p^2 = .074$, but not of group, $F(1, 129) = .30, p = .584, \eta_p^2 = .002$, nor of

720 sociality, $F(1, 129) = 1.80, p = .183, \eta_p^2 = .014$. Ratings were higher overall for
721 emotions shared with other animals than for uniquely human emotions.

722 There was a significant interaction between group and sociality, $F(1, 129) =$
723 $213.36, p < .001, \eta_p^2 = .623$, group and humanness, $F(1, 129) = 59.99, p < .001, \eta_p^2 =$
724 $.306$, and sociality and humanness, $F(1, 129) = 56.59, p < .001, \eta_p^2 = .305$. Pairwise
725 comparisons showed that overall, ratings were higher for ingroup than outgroup for
726 prosocial emotions, but higher for outgroup than ingroup for antisocial emotions (ps
727 $< .001$). Ratings were also higher for outgroup than ingroup for uniquely human
728 emotions, but higher for ingroup than outgroup on emotions shared with other
729 animals ($ps < .001$).

730 All effects were qualified in a significant three-way interaction $F(1, 129) =$
731 $37.90, p < .001, \eta_p^2 = .227$. Planned comparisons showed that ratings were higher for
732 ingroup than outgroup on prosocial terms, both uniquely human and shared with
733 other animals and higher for outgroup than ingroup on antisocial terms both uniquely
734 human and shared with other animals (all $ps < .001$).

735 **5.2.2.6. Experiment 2f**

736 For 'climate change deniers' (outgroup) and 'climate change believers' (ingroup),
737 there was a significant main effect of humanness, $F(1, 129) = 102.37, p < .001, \eta_p^2 =$
738 $.442$, of group, $F(1, 129) = 6.32, p = .013, \eta_p^2 = .047$, and a marginal effect of
739 sociality, $F(1, 129) = 3.85, p = .052, \eta_p^2 = .029$. Ratings were higher overall for
740 emotions shared with other animals than for uniquely human emotions, for ingroup
741 than outgroup, and for antisocial than prosocial emotions.

742 There was a significant interaction between group and sociality, $F(1, 129) =$
743 $47.03, p < .001, \eta_p^2 = .267$, group and humanness, $F(1, 129) = 84.72, p < .001, \eta_p^2 =$

744 .396, and sociality and humanness, $F(1, 129) = 9.37, p = .003, \eta_p^2 = .068$. Pairwise
 745 comparisons showed that overall, ratings were higher for ingroup than outgroup for
 746 prosocial emotions, but higher for outgroup than ingroup for antisocial emotions (ps
 747 $< .001$). Ratings were also higher for outgroup than ingroup for uniquely human
 748 emotions, but higher for ingroup than outgroup on emotions shared with other
 749 animals ($ps < .001$).

750 All effects were qualified in a significant three-way interaction $F(1, 129) =$
 751 $14.04, p < .001, \eta_p^2 = .098$. Planned comparisons showed that ratings were higher for
 752 ingroup than outgroup on prosocial terms, both uniquely human ($p = .001$) and
 753 shared with other animals ($p < .001$), and higher for outgroup than ingroup on
 754 uniquely human antisocial terms ($p < .001$). However, there was no difference
 755 between ingroup and outgroup on antisocial terms shared with other animals ($p =$
 756 $.200$).

757 Mean scores (M) and standard errors of the mean (SE) for each of the
 758 conditions across all experiments in Study 2 are shown in supplementary
 759 information, Table S3. Figure 3 shows results for Study 2.

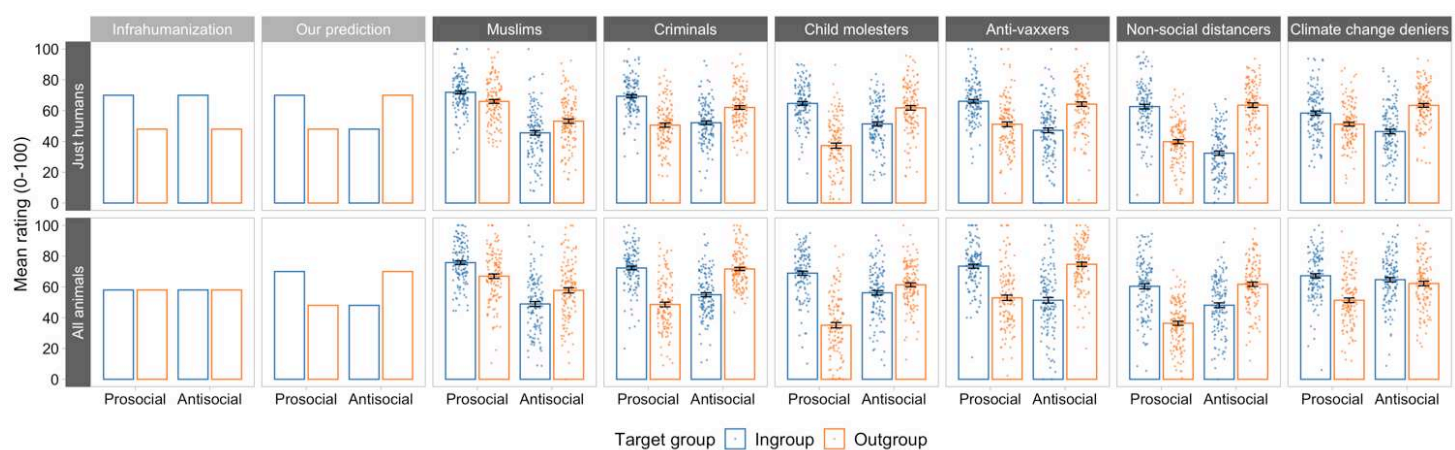


Figure 3. Evidence for social preferences but not infrahumanization. Contrary to infrahumanization theory, ratings were higher for the ingroup than the outgroup for

prosocial emotions but higher for the outgroup than the ingroup for antisocial emotions across all group contexts. Note that while main effects of valence have been reported in some prior work (see Leyens et al., 2001, p. 402, Fig. 2), we do not plot these in our predictions, as they are not relevant for distinguishing between the theories. Error bars represent standard errors.

760 **5.3. Study 2 Discussion**

761 Contrary to infrahumanization theory, outgroups were not denied uniquely human
762 emotions relative to ingroups. All outgroups were thought to experience prosocial
763 emotions to a lesser extent than ingroups, both for uniquely human emotions and for
764 those shared with other animals. However, all outgroups were also thought to
765 experience uniquely human antisocial emotions to a greater extent than ingroup
766 members. Muslims, criminals, child molesters, anti-vaxxers and non-social
767 distancers were rated as experiencing antisocial emotions shared with other animals
768 to a greater extent than the ingroup. However, there was no difference between
769 climate change deniers and the ingroup for this condition. This may be because in
770 this context, it is reasonable to suppose believers in climate change experience
771 substantial levels of emotions such as anger and irritation. This highlights the
772 importance of social context and stereotyping as well as ingroup preferences in
773 explaining emotion attribution. Study 3 employed a minimal groups design in order
774 to measure similar effects in the absence of learned stereotypes and historical
775 negative feeling.

776

777 **6. Study 3: Testing the social preference account with minimal groups**

778 In our final experiment, we aim to replicate findings from Study 2 within a minimal
779 groups design. Though we chose our six outgroup exemplars for Studies 1 and 2 to
780 maximise our chances of detecting infrahumanization should it occur (based on past
781 empirical work and also following suggestions from Leyens, 2009), it remains
782 possible that learned stereotypes and intergroup antagonism may have weighted
783 responses towards reflecting social preferences as opposed to subtle
784 dehumanization. By using a minimal groups design, we were able to ensure we
785 tested between the two competing hypotheses in the absence of these additional
786 factors. Prior work has reported infrahumanization effects in minimal groups
787 (Demoulin et al., 2009; Simon & Gutsell, 2020), meaning this approach was
788 methodologically appropriate for comparing the two theories.

789 Participants were first allocated to novel groups using a dot estimation task
790 (Diehl, 1990; Ratner & Amodio, 2013; Tajfel, 1970). Then, participants rated the
791 novel ingroup and novel outgroup on emotional experiences as described for Study
792 2. The study design and predictions were identical as for Study 2. Infrahumanization
793 would be observed in an interaction between group and humanness such that
794 uniquely human emotions are more strongly ascribed to ingroup than outgroup, both
795 for prosocial and antisocial emotions. However, we again hypothesised that
796 prosocial human emotions would typically be attributed more strongly to the ingroup
797 and antisocial ones to the outgroup.

798 **6.1. Study 3 Methods**

799 **6.1.1. Participants**

800 Based on the same power analysis as reported for Studies 1 and 2, 130 different
801 participants completed the ratings in each experiment. Participants were eligible to

802 take part if they were over 18, fluent in English, and had not taken part in any of the
803 other experiments reported presently. Nine people failed one or more attention
804 check and their data was excluded and replaced. Of the final sample, 56
805 participants were female and 74 were male, aged from 18 to 57 (Mean age = 26.8,
806 $SD = 9.10$).

807 **6.1.2. Minimal group paradigm**

808 Participants were assigned to novel groups based on a classic dot estimation task
809 (e.g., Diehl, 1990; Ratner & Amodio, 2013; Tajfel, 1970). Participants were told that
810 the purpose of the study was to help us understand the ways in which people
811 ascribe emotions to different groups of individuals and that they would first perform
812 a simple numerical estimation task to identify which group (out of two) they belonged
813 to. Instead of the common categories of 'over-estimators' and 'under-estimators', we
814 used the terms 'spatial-estimators' and 'object-estimators'. This was because the
815 emotion attribution task relied on a form of estimation (of emotional experience) and
816 we wanted to ensure the group labels did not interact with later emotion judgments.
817 Before the task, participants were told that people can be categorised as taking an
818 object approach to estimation ('object-estimators') or a spatial approach to
819 estimation ('spatial-estimators') and that individual tendencies for the two styles are
820 equally distributed in the population.

821 In the dot estimation task, participants saw eleven images of random patterns
822 of dots each on the screen for 1 second. After each image, participants had to enter
823 the number of dots they believed they had seen before the next image appeared.

824 The task and stimuli were based on an Inquisit script from Millisecond
825 (<https://www.millisecond.com>) adapted for presentation on Qualtrics.

826 Following the task, half of the participants were told they had been classified
827 as a spatial-estimator and the other half were told they had been classified as an
828 object-estimator. This procedure met the key criteria for a minimal group paradigm
829 (Tajfel, 1970; Tajfel et al., 1971).

830 **6.1.3. Stimuli, Scales, Procedure, Design and data analysis**

831 The emotion stimuli, scale presentation, procedure, design and planned data
832 analysis were all exactly the same as outlined for Study 2.

833 **6.2. Study 3 Results**

834 **6.2.1. Blatant dehumanization and attitude scores**

835 The novel outgroup was rated as significantly less human than the novel ingroup on
836 the blatant dehumanization scale ($p=.002$) (Figure 1). However the novel outgroup
837 was still rated closest to the silhouette reminiscent of a modern human on the scale,
838 and was not 'blatantly dehumanized' to the extent that outgroups in Studies 1 and 2
839 were. Participants reported feeling significantly more negative towards the novel
840 outgroup than the novel ingroup on the attitude scale ($p<.001$). Figure S1
841 (supplementary information) shows mean results for the ingroup and outgroup on
842 the blatant dehumanization and group preference measures.

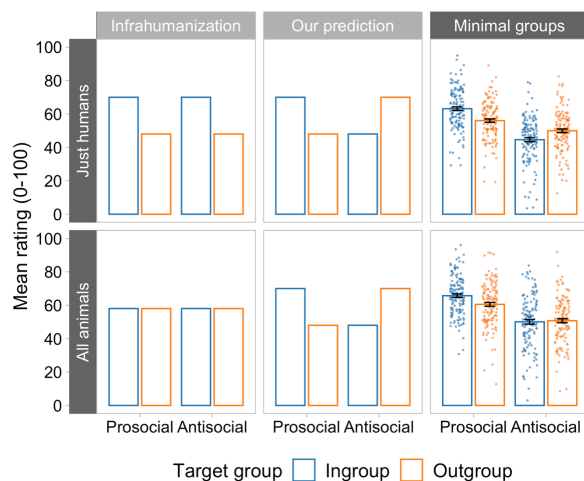
843 **6.2.2. Intergroup emotion ascription ratings**

844 For ratings towards novel ingroup and outgroup members (minimal group design),
845 there were main effects of group, $F(1, 129) = 7.58, p = .007, \eta_p^2 = .055$, of
846 humanness, $F(1, 129) = 32.93, p < .001, \eta_p^2 = .203$, and of sociality, $F(1, 129) =$
847 $99.74, p < .001, \eta_p^2 = .436$. Ratings were higher overall for ingroup than outgroup, for
848 emotions shared with other animals than for uniquely human emotions, and for
849 prosocial than antisocial emotions.

850 There was a significant interaction between group and sociality, $F(1, 129) =$
 851 22.45, $p < .001$, $\eta_p^2 = .148$, but not between group and humanness, $F(1, 129) = 1.84$,
 852 $p = .177$, $\eta_p^2 = .014$, nor between humanness and sociality, $F(1, 129) = .15$, $p = .704$,
 853 $\eta_p^2 = .001$. Pairwise comparisons showed that overall, ratings were higher for
 854 ingroup than outgroup for prosocial emotions ($p < .001$), but higher for outgroup than
 855 ingroup for antisocial emotions ($p = .007$).

856 All effects were qualified in a significant three-way interaction $F(1, 129) =$
 857 13.25, $p < .001$, $\eta_p^2 = .093$. Planned comparisons showed that ratings were higher
 858 for ingroup than outgroup on prosocial terms, both uniquely human and shared with
 859 other animals ($ps < .001$). Ratings were higher for outgroup than ingroup on
 860 uniquely human antisocial terms ($p < .001$), but for antisocial terms shared with
 861 other animals there was no difference between ingroup and outgroup ($p = .637$).

862 Mean scores (M) and standard errors of the mean (SE) for each of the
 863 conditions in Study 3 are shown in, supplementary information, Table S4. Figure 4
 864 shows results for Study 3.



865 Target group □ Ingroup □ Outgroup

866 **Figure 4. Evidence for social preference but not infrahumanization in a**
 867 **minimal group design.** Contrary to infrahumanization theory and in line with the

868 social preference account ratings were higher for the ingroup than the outgroup for
869 prosocial uniquely human emotions but higher for the outgroup than the ingroup for
870 antisocial uniquely human emotions. Error bars represent standard errors.

871 **6.3. Study 3 Discussion**

872 Contrary to the predictions of infrahumanization theory novel outgroup members
873 were not denied uniquely human emotions relative to novel ingroup members. There
874 was no significant interaction between group and humanness but there was an
875 interaction between group and sociality. Outgroup members were thought to
876 experience prosocial uniquely human emotions to a lesser extent than ingroup
877 members, but antisocial uniquely human emotions to a greater extent than ingroup
878 members. This finding shows that even in a novel group context free from learned
879 stereotypes and antagonism, our social preference account better explains
880 intergroup biases in emotion attribution than infrahumanization theory.

881

882 **7. General discussion**

883 We found no convincing evidence for infrahumanization. In our first set of studies we
884 broadly replicated previously reported effects (Study 1) showing our paradigm was
885 well placed to detect infrahumanization if it occurs. Our subsequent results suggest
886 that, in the seven intergroup contexts we employed, what appeared to be evidence
887 for infrahumanization can be better explained by social preference (Study 2). When
888 emotion terms varied on sociality rather than on valence, people did not 'subtly
889 dehumanize' the outgroups we included by denying them uniquely human emotions.
890 Rather, they attributed prosocial emotions more strongly to ingroup members and
891 antisocial emotions more strongly to outgroup members, regardless of humanness.

892 This accords with recent critiques of the social psychological literature on
893 dehumanization more generally (Bloom, 2017; Lang, 2010, 2020; Manne, 2016,
894 2018; Over, 2020a, 2020b; Smith, 2014, 2016) and offers an important conceptual
895 development to our understanding of intergroup bias in emotion judgements.

896 In practical terms, more accurately characterising the ways in which the
897 emotions of different groups are perceived has important implications for real world
898 settings such as criminal justice, in which certain defendants, for example those
899 perceived as belonging to a religious outgroup, might be unfairly viewed as
900 possessing lower levels of remorse but also higher levels of contempt as a result of
901 their group membership. One of the main reasons why infrahumanization theory has
902 been influential in intergroup relations research is because it has been causally
903 linked to negative behavioural consequences. For example, previous research has
904 suggested that infrahumanizing outgroups reduces prosocial behaviour towards
905 them (Cuddy et al., 2007; Vaes et al., 2002, 2003). In light of the present findings,
906 future research would benefit from revisiting previously-reported links between
907 biases in emotion attribution and prosocial and antisocial behaviours.

908 Our results dovetail with recent empirical work that challenges the predictions
909 made by Haslam's (2006) dual model of dehumanization (Enock et al., 2021). This
910 research showed that when undesirable human-specific characteristics (such as
911 'corrupt' and 'selfish') are included in overall measures of humanness, there is no
912 evidence for either animalistic or mechanistic dehumanization of outgroups as
913 characterised by the dual model. Rather, desirable human qualities are more
914 strongly attributed to ingroup members and undesirable human qualities to outgroup
915 members. The present work extends these findings by further demonstrating the

916 importance of considering sociality confounds when measuring psychological
917 processes of 'dehumanization', this time through another highly prominent
918 framework within the field.

919 During the review process, it was put to us that because dimensions of
920 valence and sociality correlate highly in our pretest, the two constructs are
921 "indistinguishable", thus rendering our critique obsolete. We believe this represents
922 a misunderstanding. Height and weight are strongly positively correlated, yet they
923 are distinct constructs. Similarly, even though emotions that are generally perceived
924 as prosocial may also be perceived as positive to experience, and emotions that are
925 generally perceived as antisocial may also be perceived as negative to experience,
926 the two constructs are clearly conceptually distinct. While sadness is negative to
927 experience, it is not inherently antisocial in character. Schadenfreude on the other
928 hand is, by definition, positive to experience but antisocial in character. Many
929 research findings converge on the view that while 'regret' or 'remorse' are negative
930 to feel they are not unkind in character (Stearns & Parrott, 2012, see also Parkinson,
931 1996; Vaish & Hepach, 2020; van Kleef et al., 2016). Our argument is that the kinds
932 of negative emotions that proponents of infrahumanization theory have included in
933 previous research, such as disillusion, regret, melancholy and remorse (e.g., Banton
934 et al., 2020; Leyens et al., 2001; Paladino et al., 2002; Vaes et al., 2003) are
935 negative to experience but are not antisocial and so are not best placed to
936 determine whether infrahumanization is separate from intergroup preference.

937 While our results offer an important and novel empirical critique of prior work
938 on infrahumanization, we acknowledge that we only tested seven intergroup
939 contexts. Our social contexts varied in animosity, with some containing high prior

940 animosity (criminals and child molesters) and some containing little or no prior
941 animosity (minimal groups). Despite this, without testing many more groups (such
942 as those based on nationality, race or gender), it remains a possibility that
943 infrahumanization could sometimes occur even when sociality of emotion is
944 controlled. However, participants explicitly dehumanized all seven outgroups relative
945 to the ingroup on the blatant dehumanization scale, suggesting we would likely
946 observe infrahumanization if it occurs (Kteily et al., 2015). Further, the groups we
947 chose exemplify the criteria for infrahumanization proposed in prior work (Leyens,
948 2009).

949 Our results demonstrate both ingroup favouritism (assigning greater prosocial
950 feeling to the ingroup) and outgroup derogation (assigning greater antisocial feeling
951 to the outgroup) (Brewer, 1999; Hewstone et al., 2002). However, we also note that
952 group specific stereotypes and particular social contexts are likely to play an
953 important role in these processes (Fiske et al., 2002). For example, it is likely that
954 group status may affect the specific emotions that are ascribed to group members.
955 Emotions such as 'contempt' and 'schadenfreude' are included as exemplars of
956 antisocial uniquely human emotions in the present work, but it may not be the case
957 that outgroup members perceived as 'lower status' such as homeless people would
958 be attributed these antisocial emotions to a greater extent than the ingroup because
959 these particular emotions imply a position of status. There may be other uniquely
960 human yet antisocial emotions that a 'lower status' outgroup may be more likely to
961 be perceived as experiencing, such as bitterness or envy. Similarly, it is possible
962 that groups such as 'immigrants' could be perceived as feeling high levels of
963 optimism or nostalgia by nature of their situation. Our goal in this research was not

964 to explore the many nuances of emotion attribution in intergroup contexts but rather
965 more modest in scope, we aimed to show that apparent evidence for
966 infrahumanization may be better explained by other factors. Future work would
967 benefit from more closely examining the role of stereotypes and specific social
968 contexts as well as preference effects in explaining intergroup bias in emotion
969 attribution.

970 We also acknowledge that we only employed explicit measures whereas
971 infrahumanization theory has also gained support from implicit measures (Boccatto
972 et al., 2007; Paladino et al., 2002). We chose to do this because explicit measures
973 have provided considerably stronger evidence for infrahumanization than have
974 implicit measures. Results from implicit measures showing stronger associations
975 between certain groups and particular emotion terms are inherently ambiguous. It is
976 not clear whether automatic associations reflect estimates of the emotions the group
977 experiences, or whether they reflect participants' own emotional reaction. For
978 example, would an implicit association between 'anger' and 'immigrants' reflect a
979 belief that immigrants feel anger, or automatic anger towards immigrants? The
980 former could support infrahumanization theory but there is no way to rule out the
981 latter. Nevertheless, the field would benefit from careful empirical research
982 rigorously controlling for emotion sociality in more implicit contexts. Additionally, we
983 acknowledge that, following the majority of prior work on infrahumanization, we
984 conceptualised humanness and valence/sociality dichotomously and as such tested
985 our predictions with relatively few exemplars from each category. Though this
986 approach is standard in the field, future work may benefit from testing similar

987 hypotheses but treating humanness and sociality as continuous predictors (see
988 Castano & Giner-Sorolla, 2006).

989 These possibilities do not detract from the central importance of our critique.
990 More generally, our results illustrate the importance of considering the sociality of
991 emotion terms employed as stimuli, a methodological advancement that will be
992 crucial to incorporate in any future studies of emotion attribution in other intergroup
993 contexts. To accurately test for ‘infracommunication’, future research must consider
994 the central role of emotion sociality as separate from emotional experience. Prior
995 work has reported infracommunication to be extremely widespread in society and
996 prevalent across a multitude of intergroup divides (Banton et al., 2020; Cortes et al.,
997 2005; Cuddy et al., 2007; Gaunt, 2009; Leyens et al., 2000, 2001; Rodríguez-Pérez
998 et al., 2011; Simon & Gutsell, 2020; Vaes et al., 2002, 2003). Rigorous
999 measurement, tighter experimental control and more careful consideration of social
1000 context may change some or all of the conclusions from previous research.

1001 If psychological research is to effectively inform intervention to improve
1002 intergroup relations, it is essential it accurately characterises the underlying
1003 mechanisms of intergroup bias. Our findings suggest the construct of
1004 infracommunication may obscure more than it reveals about intergroup bias.

References

- 1005 Appiah, K. A. (2008). *Experiments in ethics*. Harvard University Press.
- 1006 Banton, O., West, K., & Kinney, E. (2020). The surprising politics of anti-immigrant
1007 prejudice: How political conservatism moderates the effect of immigrant race
1008 and religion on infrahumanization judgements. *British Journal of Social
1009 Psychology, 59*(1), 157–170. <https://doi.org/10.1111/bjso.12337>
- 1010 Bastian, B., Denson, T. F., & Haslam, N. (2013). The roles of dehumanization and
1011 moral outrage in retributive justice. *PloS One, 8*(4).
- 1012 Bloom, P. (2017). *The Root of All Cruelty?* The New Yorker.
1013 <https://www.newyorker.com/magazine/2017/11/27/the-root-of-all-cruelty>
- 1014 Boccato, G., Cortes, B. P., Demoulin, S., & Leyens, J.-P. (2007). The automaticity of
1015 infra-humanization. *European Journal of Social Psychology, 37*(5), 987–999.
- 1016 Brown, R., Eller, A., Leeds, S., & Stace, K. (2007). Intergroup contact and intergroup
1017 attitudes: A longitudinal study. *European Journal of Social Psychology, 37*(4),
1018 692–703.
- 1019 Calfano, B. (2018). *Muslims, Identity, and American Politics*. Routledge.
- 1020 Capozza, D., Trifiletti, E., Vezzali, L., & Favara, I. (2013). Can intergroup contact
1021 improve humanity attributions? *International Journal of Psychology, 48*(4),
1022 527–541.
- 1023 Castano, E., & Giner-Sorolla, R. (2006). Not quite human: Infrahumanization in
1024 response to collective responsibility for intergroup killing. *Journal of
1025 Personality and Social Psychology, 90*(5), 804.
- 1026 Cortes, B. P., Demoulin, S., Rodriguez, R. T., Rodriguez, A. P., & Leyens, J.-P.
1027 (2005). Infrahumanization or Familiarity? Attribution of Uniquely Human

1028 Emotions to the Self, the Ingroup, and the Outgroup. *Personality and Social*
1029 *Psychology Bulletin*, 31(2), 243–253.
1030 <https://doi.org/10.1177/0146167204271421>

1031 Cuddy, A. J. C., Rock, M. S., & Norton, M. I. (2007). Aid in the Aftermath of
1032 Hurricane Katrina: Inferences of Secondary Emotions and Intergroup Helping.
1033 *Group Processes & Intergroup Relations*, 10(1), 107–118.
1034 <https://doi.org/10.1177/1368430207071344>

1035 Demoulin, S., Cortes, B., Viki, T., Rodríguez, A., Rodríguez, R., Paladino, M., &
1036 Leyens, J.-P. (2009). The Role of In-group Identification in Infra-
1037 humanization. *International Journal of Psychology: Journal International de*
1038 *Psychologie*, 44, 4–11. <https://doi.org/10.1080/00207590802057654>

1039 Demoulin, S., Leyens, J., Paladino, M., Rodriguez-Torres, R., Rodriguez-Perez, A.,
1040 & Dovidio, J. (2004). Dimensions of “uniquely” and “non-uniquely” human
1041 emotions. *Cognition & Emotion*, 18(1), 71–96.
1042 <https://doi.org/10.1080/02699930244000444>

1043 Diehl, M. (1990). The minimal group paradigm: Theoretical explanations and
1044 empirical findings. *European Review of Social Psychology*, 1(1), 263–292.

1045 Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, 6(3–4),
1046 169–200. <https://doi.org/10.1080/02699939208411068>

1047 Enock, F. E., Flavell, J. C., Tipper, S. P., & Over, H. (2021). No convincing evidence
1048 outgroups are denied uniquely human characteristics: Distinguishing
1049 intergroup preference from trait-based dehumanization. *Cognition*, 212,
1050 104682.

1051 Gaunt, R. (2009). Superordinate Categorization as a Moderator of Mutual
1052 Infrahumanization. *Group Processes & Intergroup Relations*, 12(6), 731–746.
1053 <https://doi.org/10.1177/1368430209343297>

1054 Goff, P. A., Eberhardt, J. L., Williams, M. J., & Jackson, M. C. (2008). Not yet
1055 human: Implicit knowledge, historical dehumanization, and contemporary
1056 consequences. *Journal of Personality and Social Psychology*, 94(2), 292–
1057 306. <https://doi.org/10.1037/0022-3514.94.2.292>

1058 Goff, P. A., Jackson, M. C., Di Leone, B. A. L., Culotta, C. M., & DiTomasso, N. A.
1059 (2014). The essence of innocence: Consequences of dehumanizing Black
1060 children. *Journal of Personality and Social Psychology*, 106(4), 526.

1061 Harris, L. T., & Fiske, S. T. (2006). Dehumanizing the lowest of the low:
1062 Neuroimaging responses to extreme out-groups. *Psychological Science*,
1063 17(10), 847–853. <https://doi.org/10.1111/j.1467-9280.2006.01793.x>

1064 Haslam, N. (2006). Dehumanization: An Integrative Review. *Personality and Social*
1065 *Psychology Review*, 10(3), 252–264.
1066 https://doi.org/10.1207/s15327957pspr1003_4

1067 Haslam, N., & Loughnan, S. (2014). Dehumanization and Infrahumanization. *Annual*
1068 *Review of Psychology*, 65(1), 399–423. <https://doi.org/10.1146/annurev->
1069 psych-010213-115045

1070 Haslam, N., & Stratemeyer, M. (2016). Recent research on dehumanization. *Current*
1071 *Opinion in Psychology*, 11, 25–29.
1072 <https://doi.org/10.1016/j.copsyc.2016.03.009>

1073 Hewstone, M., & Schmid, K. (2014). Neighbourhood ethnic diversity and orientations
1074 toward Muslims in Britain: The role of intergroup contact. *The Political*
1075 *Quarterly*, *85*(3), 320–325.

1076 Johnson, N. F., Velásquez, N., Restrepo, N. J., Leahy, R., Gabriel, N., El Oud, S.,
1077 Zheng, M., Manrique, P., Wuchty, S., & Lupu, Y. (2020). The online
1078 competition between pro- and anti-vaccination views. *Nature*, *582*(7811),
1079 230–233. <https://doi.org/10.1038/s41586-020-2281-1>

1080 Kteily, N., Bruneau, E., Waytz, A., & Cotterill, S. (2015). The ascent of man:
1081 Theoretical and empirical evidence for blatant dehumanization. *Journal of*
1082 *Personality and Social Psychology*, *109*(5), 901–931.
1083 <https://doi.org/10.1037/pspp0000048>

1084 Kteily, N., Hodson, G., & Bruneau, E. (2016). They see us as less than human:
1085 Metadehumanization predicts intergroup conflict via reciprocal
1086 dehumanization. *Journal of Personality and Social Psychology*, *110*(3), 343.

1087 Lang, J. (2010). Questioning Dehumanization: Intersubjective Dimensions of
1088 Violence in the Nazi Concentration and Death Camps. *Holocaust and*
1089 *Genocide Studies*, *24*, 225–246. <https://doi.org/10.1093/hgs/dcq026>

1090 Lang, J. (2020). The limited importance of dehumanization in collective violence.
1091 *Current Opinion in Psychology*.

1092 Leyens, J.-P. (2009). Retrospective and prospective thoughts about
1093 infrahumanization. *Group Processes & Intergroup Relations*, *12*(6), 807–817.

1094 Leyens, J.-P., Paladino, P. M., Rodriguez-Torres, R., Vaes, J., Demoulin, S.,
1095 Rodriguez-Perez, A., & Gaunt, R. (2000). The Emotional Side of Prejudice:
1096 The Attribution of Secondary Emotions to Ingroups and Outgroups.

1097 *Personality and Social Psychology Review*, 4(2), 186–197.

1098 https://doi.org/10.1207/S15327957PSPR0402_06

1099 Leyens, J.-P., Rodriguez-Perez, A., Rodriguez-Torres, R., Gaunt, R., Paladino, M.-
1100 P., Vaes, J., & Demoulin, S. (2001). Psychological essentialism and the
1101 differential attribution of uniquely human emotions to ingroups and outgroups.
1102 *European Journal of Social Psychology*, 31(4), 395–411.
1103 <https://doi.org/10.1002/ejsp.50>

1104 Manne, K. (2016). Humanism: A Critique. *Social Theory and Practice*, 42(2), 389–
1105 415. JSTOR.

1106 Manne, K. (2018). *Down Girl: The Logic of Misogyny*. Oxford University Press.

1107 Over, H. (2020a). Falsifying the Dehumanization Hypothesis. *Perspectives on*
1108 *Psychological Science*, 1745691620969657.

1109 Over, H. (2020b). Seven challenges for the dehumanisation hypothesis.
1110 *Perspectives on Psychological Science*.

1111 Paladino, M.-P., Leyens, J.-P., Rodriguez, R., Rodriguez, A., Gaunt, R., & Demoulin,
1112 S. (2002). Differential Association of Uniquely and Non Uniquely Human
1113 Emotions with the Ingroup and the Outgroup. *Group Processes & Intergroup*
1114 *Relations*, 5(2), 105–117. <https://doi.org/10.1177/1368430202005002539>

1115 Parkinson, B. (1996). Emotions are social. *British Journal of Psychology*, 87(4),
1116 663–683. <https://doi.org/10.1111/j.2044-8295.1996.tb02615.x>

1117 Prati, F., Crisp, R. J., Meleady, R., & Rubini, M. (2016). Humanizing outgroups
1118 through multiple categorization: The roles of individuation and threat.
1119 *Personality and Social Psychology Bulletin*, 42(4), 526–539.

- 1120 Prosser, A. M. B., Judge, M., Bolderdijk, J. W., Blackwood, L., & Kurz, T. (2020).
1121 'Distancers' and 'non-distancers'? The potential social psychological impact
1122 of moralizing COVID-19 mitigating practices on sustained behaviour change.
1123 *British Journal of Social Psychology*, 59(3), 653–662.
1124 <https://doi.org/10.1111/bjso.12399>
- 1125 Rai, T. S., Valdesolo, P., & Graham, J. (2017). Dehumanization increases
1126 instrumental violence, but not moral violence. *Proceedings of the National
1127 Academy of Sciences*, 114(32), 8511–8516.
- 1128 Ratner, K. G., & Amodio, D. M. (2013). Seeing “us vs. them”: Minimal group effects
1129 on the neural encoding of faces. *Journal of Experimental Social Psychology*,
1130 49(2), 298–301. <https://doi.org/10.1016/j.jesp.2012.10.017>
- 1131 Rodríguez-Pérez, A., Delgado-Rodríguez, N., Betancor-Rodríguez, V., Leyens, J.-
1132 P., & Vaes, J. (2011). Infra-humanization of outgroups throughout the world.
1133 The role of similarity, intergroup friendship, knowledge of the outgroup, and
1134 status. *Anales de Psicología*, 27(3), 679–687.
- 1135 Simon, J. C., & Gutsell, J. N. (2020). Effects of minimal grouping on implicit
1136 prejudice, infrahumanization, and neural processing despite orthogonal social
1137 categorizations. *Group Processes & Intergroup Relations*, 23(3), 323–343.
- 1138 Smith, D. L. (2011). *Less Than Human: Why We Demean, Enslave, and
1139 Exterminate Others*. St. Martin's Publishing Group.
- 1140 Smith, D. L. (2014). Dehumanization, Essentialism, and Moral Psychology:
1141 Dehumanization, Essentialism, and Moral Psychology. *Philosophy Compass*,
1142 9(11), 814–824. <https://doi.org/10.1111/phc3.12174>

- 1143 Smith, D. L. (2016). Paradoxes of Dehumanization. *Social Theory and Practice*,
1144 42(2), 416–443. <https://doi.org/10.5840/soctheorpract201642222>
- 1145 Smith, D. L. (2020). *On inhumanity: Dehumanization and how to resist it*. Oxford
1146 University Press.
- 1147 Stearns, D. C., & Parrott, W. G. (2012). When feeling bad makes you look good:
1148 Guilt, shame, and person perception. *Cognition and Emotion*, 26(3), 407–
1149 430. <https://doi.org/10.1080/02699931.2012.675879>
- 1150 Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*,
1151 223(5), 96–103.
- 1152 Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization
1153 and intergroup behaviour. *European Journal of Social Psychology*, 1(2), 149–
1154 178. <https://doi.org/10.1002/ejsp.2420010202>
- 1155 Tam, T., Hewstone, M., Cairns, E., Tausch, N., Maio, G., & Kenworthy, J. (2007).
1156 The impact of intergroup emotions on forgiveness in Northern Ireland. *Group*
1157 *Processes & Intergroup Relations*, 10(1), 119–136.
- 1158 Tirrell, L. (2012). Genocidal Language Games. In I. Maitra & M. K. McGowan (Eds.),
1159 *Speech and Harm: Controversies Over Free Speech* (pp. 174–221). Oxford
1160 University Press.
- 1161 Vaes, J., Leyens, J.-P., Paola Paladino, M., & Pires Miranda, M. (2012). We are
1162 human, they are not: Driving forces behind outgroup dehumanisation and the
1163 humanisation of the ingroup. *European Review of Social Psychology*, 23(1),
1164 64–106. <https://doi.org/10.1080/10463283.2012.665250>
- 1165 Vaes, J., Paladino, M. P., Castelli, L., Leyens, J.-P., & Giovanazzi, A. (2003). On the
1166 Behavioral Consequences of Infracumanization: The Implicit Role of Uniquely

- 1167 Human Emotions in Intergroup Relations. *Journal of Personality and Social*
1168 *Psychology*, 85(6), 1016–1034. <https://doi.org/10.1037/0022-3514.85.6.1016>
- 1169 Vaes, J., Paladino, M.-P., & Leyens, J.-P. (2002). The lost e-mail: Prosocial
1170 reactions induced by uniquely human emotions. *British Journal of Social*
1171 *Psychology*, 41(4), 521–534. <https://doi.org/10.1348/014466602321149867>
- 1172 Viki, G. T., Fullerton, I., Raggett, H., Tait, F., & Wiltshire, S. (2012). The role of
1173 dehumanization in attitudes toward the social exclusion and rehabilitation of
1174 sex offenders. *Journal of Applied Social Psychology*, 42(10), 2349–2367.
- 1175 Viki, G. T., Osgood, D., & Phillips, S. (2013). Dehumanization and self-reported
1176 proclivity to torture prisoners of war. *Journal of Experimental Social*
1177 *Psychology*, 49(3), 325–328. <https://doi.org/10.1016/j.jesp.2012.11.006>

Supplementary Information for:

Intergroup preference, not dehumanization, explains social biases in emotion attribution

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1178 **Supplementary information for pretest**

1179

1180 **Supplementary information on pretest scales**

1181 To determine the extent to which emotions are considered to be uniquely human or
1182 shared with other species, positive or negative to experience, and prosocial or
1183 antisocial in character, participants rated fifty-four emotion words on three scales.

1184 The words we included were: anger, disgust, fear, happiness, sadness,
1185 surprise (these first six are often considered primary emotions), admiration,
1186 arrogance, bitterness, compassion, complacency, conceit, contempt, contentment,
1187 disappointment, disillusion, embarrassment, empathy, envy, friendliness, gloating,
1188 greed, grief, guilt, hatred, hope, hopelessness, hostility, humiliation, humility,
1189 irritation, jealousy, loneliness, love, melancholy, nervousness, nostalgia, optimism,
1190 patience, pride, regret, relief, remorse, resentment, resignation, schadenfreude,
1191 scorn, self-satisfaction, shame, shyness, smugness, spite, tenderness,
1192 vengefulness. These terms were obtained from prior work on inhumanization and
1193 from emotion research more generally (Demoulin et al., 2004; Leyens et al., 2001).

1194 The Humanness scale asked: “Using the slider, please indicate how much
1195 the emotion in each of the following questions is experienced by humans compared
1196 to other species (i.e., is this emotion unique to humans?)” The bottom end of the
1197 slider, 0, corresponded to *Just other species* and the top end, 100, corresponded to
1198 *Just humans*, with the midpoint, 50, indicating *Equal to humans and other species*.

1199 The Valence scale asked: “Using the slider, please indicate what you think
1200 this emotion is like to experience (i.e., how does it make you feel?).” The bottom end
1201 of the slider, 0, corresponded to *Extremely negative* and the top end, 100,

1202 corresponded to *Extremely positive*, with the midpoint, 50, indicating *Neutral to*
1203 *experience*.

1204 The Sociality scale asked: “Using the slider, please indicate what you think
1205 someone who regularly experiences this emotion is like (i.e., how kind are they likely
1206 to be?).” The bottom end of the slider, 0, corresponded to *Extremely unkind* and the
1207 top end, 100, corresponded to *Extremely kind*, with the midpoint, 50, indicating
1208 *Neither kind nor unkind*.

1209 Taking our lead from infrahumanization theory, we were interested in lay
1210 conceptions of emotions. As prosociality is not a common word for the general
1211 population, we use ‘kindness’ in our scale to capture ‘what you think someone who
1212 regularly experiences this emotion is like’ as opposed to ‘what you think this emotion
1213 is like to experience’. We use the term ‘sociality’ throughout to clearly distinguish
1214 from ‘valence’ as subjective experience.

1215 Each item was scored from 0-100 but participants could not see the numbers.
1216 The three scales were presented in separate blocks on sequential screens and the
1217 order of completion was counterbalanced such that one third of participants rated
1218 Humanness then Valence then Sociality, one third rated Sociality then Humanness
1219 then Valence, and one third rated Valence then Sociality then Humanness. The
1220 emotion items within each block were randomised. One attention check per block
1221 was included approximately halfway through, such as ‘Please indicate extremely
1222 positive’. Participants were excluded and their data replaced if they failed one or
1223 more attention checks.

1224

1225

1226 **Supplementary results for pretest**

1227 The mean ratings for each emotion on Humanness, Valence and Sociality are
 1228 presented in Table S1. We show ratings from most to least uniquely human, most
 1229 to least positive to experience and most to least prosocial. On the humanness scale,
 1230 we were most interested in finding emotions perceived as shared with other species
 1231 (scoring close to 50) and those perceived as being only experienced by humans
 1232 (scoring close to 100). While some emotions were rated similarly on sociality and
 1233 valence (compassion was rated as highly positive to experience and highly
 1234 prosocial), others were rated orthogonally (grief was rated as highly negative to
 1235 experience but neither prosocial nor antisocial).

1236 **Table S1. Pretest results**

Humanness			Valence			Sociality		
Most to least human			Most to least positive			Most to least prosocial		
Emotion	M	SE	Emotion	M	SE	Emotion	M	SE
Nostalgia	85.1	2.43	Happiness	95.5	1.04	Compassion	86.4	1.95
Arrogance	79.9	2.61	Love	91.7	1.72	Empathy	86.3	1.71
Optimism	79.8	2.70	Friendliness	85.0	2.12	Love	84.6	2.06
Schadenfreude	79.3	2.86	Optimism	84.6	1.67	Friendliness	82.9	2.48
Disillusion	79.2	2.39	Hope	81.0	2.05	Happiness	80.1	2.34
Humility	78.6	2.46	Compassion	80.9	2.04	Patience	75.5	2.10
Contempt	76.9	2.48	Empathy	79.1	2.09	Optimism	74.7	2.16
Regret	76.7	2.71	Relief	78.7	2.57	Tenderness	74.7	2.74
Melancholy	76.5	2.69	Self-satisfaction	78.6	2.68	Hope	71.1	1.92
Scorn	76.1	2.74	Tenderness	77.0	2.47	Admiration	70.4	2.08
Smugness	75.9	2.55	Admiration	76.9	1.86	Contentment	68.1	2.24
Humiliation	75.8	2.80	Patience	72.9	2.25	Humility	67.5	2.90
Remorse	75.6	2.41	Contentment	72.8	3.20	Relief	66.0	1.98
Embarrassment	75.1	2.53	Pride	69.8	2.69	Nostalgia	64.6	2.07
Hope	74.6	2.80	Surprise	65.4	1.86	Shyness	59.4	1.90
Greed	74.6	2.68	Humility	62.8	3.63	Surprise	58.6	1.50
Hopelessness	74.3	2.76	Nostalgia	60.8	2.93	Self-satisfaction	58.3	2.60
Conceit	74.3	2.65	Complacency	55.1	3.15	Complacency	53.4	2.51
Bitterness	74.1	2.31	Gloating	44.9	3.43	Guilt	53.0	2.34
Vengefulness	72.3	2.74	Smugness	43.6	3.55	Remorse	52.5	2.90
Resentment	71.5	2.82	Shyness	40.4	1.82	Regret	52.5	2.38
Gloating	71.3	2.60	Conceit	36.2	2.86	Pride	51.1	2.56

Hate	71.1	2.62	Schadenfreude	35.6	3.14	Nervousness	49.5	1.87
Guilt	70.5	2.83	Melancholy	34.8	2.63	Embarrassment	49.0	1.89
Complacency	70.4	2.64	Remorse	33.5	2.93	Shame	48.3	2.28
Spite	70.3	2.87	Nervousness	31.8	2.00	Grief	48.1	2.44
Shame	70.2	2.76	Contempt	31.1	2.99	Melancholy	47.6	2.30
Self-satisfaction	70.1	2.66	Resignation	26.8	2.13	Sadness	46.4	2.49
Disappointment	69.1	2.27	Disillusion	25.5	2.43	Fear	46.2	1.71
Envy	68.6	2.65	Guilt	24.9	2.12	Loneliness	45.6	2.29
Pride	68.5	2.69	Irritation	24.3	1.76	Resignation	43.8	1.81
Disgust	67.9	2.84	Arrogance	24.2	2.79	Hopelessness	42.4	2.26
Resignation	67.2	2.59	Embarrassment	23.4	2.10	Disillusion	40.7	2.14
Admiration	66.7	2.57	Regret	23.4	2.12	Disappointment	40.3	2.44
Shyness	66.4	2.40	Fear	23.3	2.28	Gloating	39.0	3.54
Relief	65.0	2.49	Spite	23.3	2.69	Smugness	35.4	3.13
Compassion	64.9	2.40	Envy	23.0	1.94	Contempt	33.8	2.65
Jealousy	64.7	2.50	Scorn	22.1	2.22	Humiliation	33.7	2.80
Patience	64.5	2.48	Resentment	21.9	1.70	Conceit	32.6	2.66
Empathy	63.4	2.87	Greed	21.6	2.39	Resentment	31.1	2.06
Contentment	62.6	2.25	Vengefulness	21.3	2.42	Irritation	29.1	2.16
Nervous	60.2	2.32	Hostility	21.3	2.89	Bitterness	28.2	2.00
Friendliness	58.6	2.12	Shame	20.8	1.85	Schadenfreude	28.1	2.89
Grief	58.5	1.67	Jealousy	19.7	1.98	Envy	27.1	2.04
Love	58.4	1.95	Disappointment	18.9	1.93	Jealousy	25.6	2.12
Anger	57.2	2.31	Grief	18.7	2.38	Scorn	25.6	2.43
Irritation	57.1	2.34	Sadness	18.1	2.42	Disgust	24.5	2.01
Surprise	56.8	1.76	Bitterness	17.9	1.62	Greed	23.9	2.26
Tenderness	56.1	1.63	Anger	17.8	1.87	Spite	22.9	2.29
Happiness	54.7	1.66	Loneliness	15.9	2.13	Anger	22.7	2.36
Sadness	54.3	1.53	Disgust	15.5	1.80	Hostility	21.6	2.96
Loneliness	53.8	1.71	Humiliation	12.9	1.75	Arrogance	20.9	1.98
Hostility	53.6	2.19	Hopelessness	12.5	1.81	Vengefulness	14.2	1.88
Fear	48.6	1.58	Hate	7.4	1.30	Hate	10.0	1.70

1237

1238 Table S1. Emotion terms scored from highest to lowest along dimensions of Humanness,

1239 Valence, and Sociality. Mean scores (M) and standard error of the mean (SE) are presented

1240 alongside each word. Respective to each scale, 100 indicated the emotion was highly

1241 unique to humans / extremely positive to experience / extremely kind (prosocial). 0 indicated

1242 the emotion was unique to other species / extremely negative to experience / extremely

1243 unkind (antisocial). 50 indicated the emotion applied equally to humans and other species /

1244 was neither positive nor negative to experience / neither kind nor unkind.

1245

1246 **Supplementary information on intergroup contexts (Studies 1 and 2)**

1247 We employed six intergroup contexts across the experiments in Studies 1 and 2. In
1248 Experiments 1a and 2a, the outgroup was Muslims and the ingroup was Christians.
1249 In Experiments 1b and 2b, the outgroup was ‘Individuals with criminal convictions’
1250 (criminals) and the ingroup was ‘Individuals with no criminal history’. In Experiments
1251 1c and 2c, the outgroup was ‘Child molesters’ and the ingroup was ‘Individuals with
1252 no criminal history’. In Experiments 1d and 2d, the outgroup was ‘Individuals who
1253 are against vaccination (‘anti-vaxxers’)’ and the ingroup was ‘Individuals who are in
1254 favour of vaccination (‘pro-vaxxers’)’. In Experiments 1e and 2e, the outgroup was
1255 ‘Individuals who do not adhere to the government regulations on social
1256 distancing/quarantine during the COVID-19 pandemic’ (‘non-social distancers’) and
1257 ingroup was ‘Individuals who do adhere to the government regulations on social
1258 distancing/quarantine during the COVID-19 pandemic’ (‘social distancers’). In
1259 Experiments 1f and 2f, the outgroup was ‘Individuals who do not believe in climate
1260 change (‘climate change deniers’)’ and the ingroup was ‘Individuals who believe in
1261 climate change (‘climate change believers’)’.

1262

1263 **Supplementary information for Study 1**

1264 **Supplementary information on stimuli development (Study 1)**

1265 We chose emotions from our pretest data that best fit the four emotion categories of
1266 interest. We chose four rated as highly positive and four rated as highly negative
1267 from both the most and least uniquely human terms.

1268 For conceptual consistency between our stimulus set and the original work
1269 (Leyens et al., 2001), we omitted negative emotions that were also rated as

1270 antisocial. This was because we suggest that the kinds of negative emotions that
1271 have been included in previous infrahumanization research (e.g., regret,
1272 melancholy, disillusion, remorse - Banton et al., 2020; Leyens et al., 2001; Paladino
1273 et al., 2002; Vaes et al., 2003) are negative to experience but are not antisocial. To
1274 first replicate infrahumanization effects, we included uniquely human emotions that
1275 were similar to ones used in prior work.

1276 In developing the items for our emotion categories, we ensured that
1277 humanness ratings did not significantly differ between the positive and negative
1278 conditions for each level of humanness so that we could accurately separate
1279 valence effects from humanness. For example, whilst Grief was rated as less unique
1280 to humans and also more negative to experience than Nervousness, when we
1281 included Grief in the stimuli, the set of non-uniquely human positive emotions was
1282 overall higher in humanness than the non-uniquely human negative emotions. We
1283 included Nervousness instead so as to ensure the non-uniquely human positive and
1284 negative emotions were matched on perceived Humanness.

1285 In support of our experimental manipulations, paired t-tests showed that
1286 combined, the uniquely human emotion words were rated as significantly more
1287 human ($M = 78.3 \pm 1.71$) than emotions shared with other species ($M = 55.3 \pm .96$),
1288 $t(59) = 14.70, p < .001, d = 1.90$. Additionally, The positive words ($M = 77.3 \pm 1.09$)
1289 were rated as significantly more positive than the negative words ($M = 25.8 \pm 1.37$),
1290 $t(59) = 28.89, p < .001, d = 3.73$. Humanness scores were comparable for positive
1291 ($M = 79.5 \pm 1.80$) and negative words ($M = 77.0 \pm 1.90$) unique to humans, $t(59) =$
1292 $1.75, p = .085, d = 0.23$ and for positive ($M = 56.5 \pm 1.15$) and negative ($M = 54.2 \pm$
1293 1.33) words shared with other species, $t(59) = 1.42, p = .159, d = 0.18$.

1294 **Supplementary information on design and data analysis (Study 1)**

1295 For each experiment, there were eight conditions in total in a 2 x 2 x 2 within-
1296 subjects design. Our overall design mirrored original work (Leyens et al., 2001) with
1297 some minor methodological developments. We measured emotion attribution by
1298 asking participants to indicate on a sliding scale the extent to which they believed
1299 each group to experience the emotion items (from *not at all* to *very strongly*) rather
1300 than by asking them to simply choose whether or not particular emotions applied to
1301 ingroups or outgroups. This was to provide potential for greater distribution in
1302 responses so that data were likely to be more appropriate for parametric statistics
1303 than in original studies, where ANOVAs were performed on counts from 0-3 in each
1304 condition.

1305 We employed a within-subjects design, only including one side of each
1306 intergroup context, omitting 'group membership' as an additional between-subjects
1307 factor. Previous work found inhumanization on both sides of group memberships
1308 and showed effects do not rest on group status (Rodríguez-Pérez et al., 2011).
1309 Further, effects have been detected in within- as well as between-subjects designs
1310 (Cortes et al., 2005). This gave us greater statistical power and the opportunity to
1311 test intergroup contexts in which it may be more difficult to obtain data from both
1312 sides.

1313

1314 **Supplementary information for Study 2**

1315 **Supplementary information on stimuli development (Study 2)**

1316 Similar to Study 1, we chose emotions from our pretest data that best fit the four
1317 emotion categories of interest. We chose four rated as prosocial and four rated as

1318 antisocial from both the most and least uniquely human terms. Though disgust was
1319 rated as somewhat more unique to humans than the other emotions categorised as
1320 shared with other species, it was included in the set of antisocial emotions shared
1321 with other species because it is widely considered a primary (or ‘basic’) emotion and
1322 also because with a mean score of ($M = 67.9 \pm 2.84$), it still fell closer to the ‘equal
1323 to humans and other species’ than the ‘just humans’ mark. While arrogance,
1324 friendliness and humility may be considered as either traits or emotions by some
1325 accounts, they are included because prior work on infrahumanization often includes
1326 trait terms as well as more traditional emotions (Capozza et al., 2013; Hodson &
1327 Costello, 2007; Vaes & Paladino, 2010). Thus, infrahumanization effects have
1328 previously been understood and reported across emotions, traits, and even simple
1329 category words such as ‘wife’ and ‘pet’ (Viki et al., 2006).

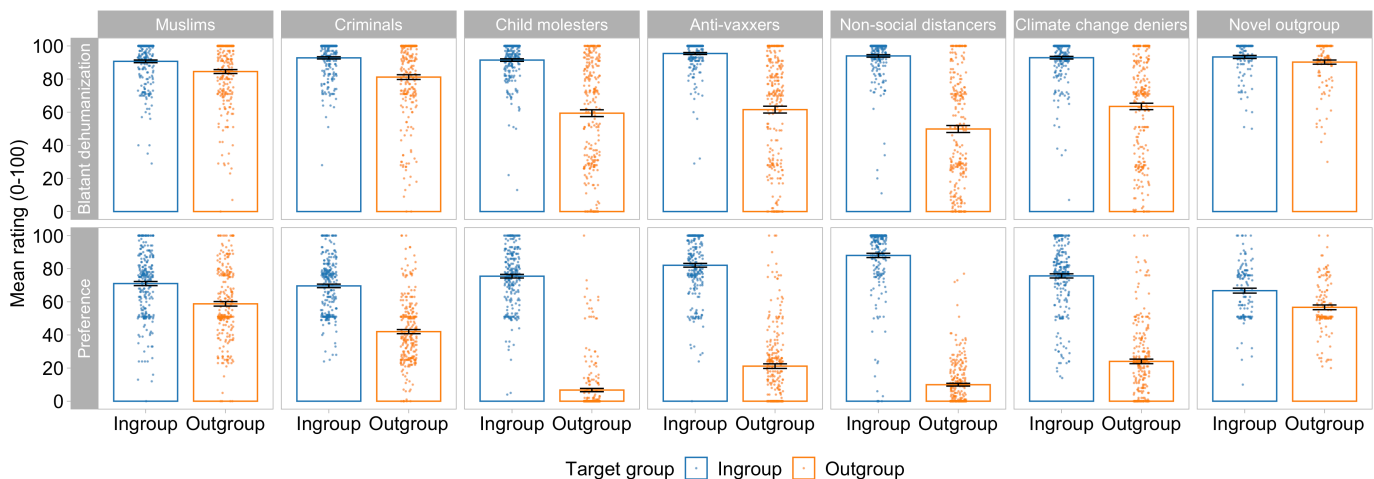
1330 Similar to Study 1, we ensured that humanness ratings did not significantly
1331 differ between the prosocial and antisocial conditions for each level of humanness
1332 so that we could accurately separate sociality effects from ones of humanness.

1333 Paired t-tests showed that combined, the uniquely human words were rated
1334 as significantly more human ($M = 78.8 \pm 1.72$) than the words shared with other
1335 species ($M = 57.8 \pm 1.07$), $t(59) = 13.87$, $p < .001$, $d = 1.79$, and the prosocial words
1336 ($M = 75.00 \pm 1.31$) were rated as significantly more prosocial than the antisocial
1337 words ($M = 25.8 \pm 1.25$), $t(59) = 21.61$, $p < .001$, $d = 2.79$. Humanness scores were
1338 comparable for prosocial ($M = 79.5 \pm 1.80$) and antisocial ($M = 78.0 \pm 2.18$) words
1339 unique to humans, $t(59) = .73$, $p = .470$, $d = 0.09$ and for prosocial ($M = 56.9 \pm 1.26$)
1340 and antisocial ($M = 58.9 \pm 1.60$) words shared with other species, $t(59) = 1.04$, p
1341 $= .302$, $d = 0.13$.

1342 A paired-samples t-test showed no significant difference in valence between
 1343 the negative uniquely human emotions in Study 1 (mean valence = 29.28, SE =
 1344 1.63) and the antisocial uniquely human emotions in Study 2 (mean valence =
 1345 28.23, SE = 1.74), $t(59) = .516$, $p = .607$, $d = .07$, with a Bayes factor of 6.23
 1346 supporting the null. However, the antisocial uniquely human emotions in Study 2
 1347 (mean sociality = 27.09, SE = 1.50) were significantly more antisocial than the
 1348 negative uniquely human emotions in Study 1 (mean sociality = 48.33, SE = 1.59),
 1349 $t(59) = .8.63$, $p < .001$, $d = 1.11$. Thus, the meaningful difference between the
 1350 uniquely human terms included in Studies 1 and 2 was in the sociality – a factor not
 1351 considered in previous infrahumanization research.

1352

1353 **Supplementary Figure S1**



1355

1356 **Figure S1.** Blatant dehumanization and preference ratings across all experiments in Studies 1, 2 and

1357 3. Outgroups are: Muslims (1a&2a), criminals (1b&2b), child molesters (1c&2c), anti-vaxxers

1358 (1d&2d), non-social distancers (1e&2e), climate change deniers (1f&2f), and minimal outgroups (3).

1359 We collapse data across Studies 1 and 2 for the first 6 groups, giving a total N of 260 per group

1360 context for these experiments. Outgroups were rated significantly lower than ingroups on the

1361 preference scale in all experiments (all $ps < .001$) and also as significantly 'less human' than ingroups

1362 on the blatant dehumanization scale (all p s <.001 in Studies 1 and 2, p =.002 in Study 3). Error bars
 1363 represent standard errors.

1364

1365 Supplementary Tables - Studies 1, 2 and 3

1366 Table S2. Mean emotion attribution scores by condition in Study 1

Expt.	Emotions unique to humans				Emotions shared with other animals			
	Positive	Positive	Negative	Negative	Positive	Positive	Negative	Negative
	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup
1a	72.6 (1.08)	63.9 (1.34)	56.5 (1.55)	52.1 (1.53)	71.2 (1.11)	62.7 (1.44)	55.4 (1.63)	57.8 (1.59)
1b	67.2 (1.16)	50.8 (1.28)	57.2 (1.37)	62.3 (1.42)	72.1 (1.26)	50.1 (1.59)	62.1 (1.56)	66.8 (1.40)
1c	67.9 (1.16)	35.3 (1.36)	56.2 (1.28)	44.1 (1.62)	70.4 (1.19)	37.9 (1.74)	60.2 (1.46)	57.7 (1.78)
1d	67.0 (1.20)	51.4 (1.61)	43.5 (1.83)	52.7 (1.70)	67.4 (1.18)	56.7 (1.50)	48.1 (1.72)	60.9 (1.66)
1e	62.0 (1.34)	40.4 (1.37)	47.0 (1.42)	35.3 (1.37)	53.5 (1.44)	40.7 (1.24)	73.2 (1.46)	35.1 (1.67)
1f	58.5 (1.11)	50.5 (1.26)	60.7 (1.16)	41.3 (1.45)	58.0 (1.22)	52.7 (1.27)	65.9 (1.24)	48.1 (1.72)

1367 Standard errors of the mean are in parentheses.

1368

1369 Table S3. Mean emotion attribution scores by condition in Study 2

Expt.	Emotions unique to humans				Emotions shared with other animals			
	Prosocial	Prosocial	Antisocial	Antisocial	Prosocial	Prosocial	Antisocial	Antisocial
	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup
2a	71.9 (1.07)	66.0 (1.22)	45.6 (1.50)	53.2 (1.39)	75.8 (1.16)	67.0 (1.47)	48.9 (1.55)	57.8 (1.69)
2b	69.4 (1.08)	50.6 (1.34)	52.1 (1.22)	62.0 (1.15)	72.3 (1.20)	48.6 (1.51)	54.9 (1.31)	71.7 (1.07)
2c	64.7 (1.14)	37.3 (1.64)	51.4 (1.30)	61.8 (1.43)	68.9 (1.36)	35.1 (1.74)	56.2 (1.46)	61.4 (1.27)
2d	66.1 (1.18)	51.2 (1.50)	47.2 (1.52)	64.2 (1.43)	73.5 (1.26)	52.9 (1.73)	51.3 (1.83)	74.7 (1.35)
2e	62.6 (1.49)	39.8 (1.24)	32.3 (1.37)	63.5 (1.41)	60.4 (1.66)	36.4 (1.31)	48.1 (1.53)	61.7 (1.39)
2f	58.4 (1.36)	51.2 (1.22)	46.4 (1.45)	63.4 (1.21)	67.2 (1.35)	51.3 (1.48)	64.7 (1.40)	62.2 (1.46)

1370 Standard errors of the mean are in parentheses.

1371

1372 Table S4. Mean emotion attribution scores by condition in Study 3

	Uniquely human emotions		Emotions shared with other animals	
	Ingroup	Outgroup	Ingroup	Outgroup
Prosocial	63.1 (1.09)	56.0 (1.02)	65.7 (1.07)	60.5 (1.18)
Antisocial	44.6 (1.20)	50.0 (1.09)	50.1 (1.39)	50.7 (1.21)

1373 Standard errors of the mean are in parentheses.

1374