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Group membership alters the threshold for mind perception: The role of social identity, collective identification, and intergroup threat

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Abstract

Human faces are used as cues to the presence of social agents, and the ability to detect minds and mental states in others occupies a central role in social interaction. In the current research, we present evidence that the human propensity for mind perception is bound by social group membership. Specifically, we show how identification with different social groups influences the threshold for mind perception. In three experiments, participants assessed a continuum of face morphs that ranged from human to doll faces. These faces were described as in-group or out-group members. Participants had higher (i.e., more stringent) thresholds for perceiving minds behind out-group faces, both in minimal (Experiment 1) and real-world groups (Experiment 2). In other words, out-group members required more humanness than in-group members to be perceived as having minds. This intergroup bias in mind perception was moderated by collective identification, such that highly identified group members had the highest threshold for perceiving minds behind out-group relative to in-group faces. In contrast, Democrats and Republicans who perceived the other party as threatening had lower thresholds for perceiving minds behind out-group faces (Experiment 3). These experiments suggest that mind perception is a dynamic process in which relevant contextual information such as social identity and out-group threat change the interpretation of physical features that signal the presence of another mind. Implications for mind perception, dehumanization, and intergroup relations are discussed. (229 words)

Keywords: **mind perception, intergroup relations, face perception, social identity, dehumanization**

Group membership alters the threshold for mind perception:

The role of social identity, collective identification, and intergroup threat

Successful human interaction requires that we recognize that those around us have thoughts, goals, and feelings. When we empathize with someone, we must first detect a mind that can feel pain, and when we negotiate with someone, we must first detect a mind that can engage in conscious planning. This basic process of extracting information from the environment to infer the potentiality for mental states—termed mind perception—plays a foundational role in social cognition. For example, inferring a mind in others allows us to see others as worthy of moral consideration (H. M. Gray, Gray, & Wegner, 2007; K. Gray, Young, & Waytz, 2012), and the failure to perceive a mind in others may facilitate prejudice and inhumane acts such as torture (Harris & Fiske, 2011). The current research examines how the threshold for perceiving minds is altered by the top-down influence of social identity and out-group threat.

Recent research has examined bottom-up perceptual inputs that lead to the detection of mind, showing that different physical features in a face alter judgments about the presence or absence of a mind. In particular, a recent paper examined mind perception by asking participants to determine if morphs between human and inanimate faces were alive and had a mind (Looser & Wheatley, 2010). Results indicated that people perceived mind and animacy once the face morphs passed a categorical threshold biased towards the human end of the morph spectrum. More recent research has investigated differences in the neural responses to animate and inanimate faces. This work has indicated that regions of the brain's face perception network, such as the lateral fusiform gyri, differentially encode human compared to inanimate faces (Looser, Guntupalli, & Wheatley, 2012). Further, research using event-related potentials suggests that the brain can differentiate between human and inanimate faces within the first few hundred milliseconds of face processing (Wheatley, Weinberg, Looser, Moran, & Hajcak, 2011).

Other research suggests that passively viewing human form may be sufficient to evoke activity in a wide range of brain regions implicated in social cognition (Wagner, Kelley, & Heatherton, 2011). Taken together, this research suggests that mind perception is a meaningful component of human face processing, encoded in the extended face network of the brain's visual system, and driven by bottom-up visual features.

It remains unexplored, however, whether this type of bottom up perceptual sensitivity to human minds can be modified by social motives. Here, it may be useful to distinguish *mind perception* from related processes of *mind attribution*, which involves higher-level judgments about the degree and kind of an entity's mental state capacities, e.g. the extent to which an entity is capable of feeling emotions or thinking (H. M. Gray et al., 2007), and *theory of mind,* which involves the attribution of mental content to a mind (Premack & Woodruff, 1978), e.g. attributing a specific belief or emotion to another person. Conceptualized in this manner, mind perception may serve as a precursor for both mind attribution and theory of mind, as well as related social cognitive processes (e.g., emotion perception). Several papers have recently suggested that mental state inferences may occur in response to the mere presentation of social scenes (Spunt & Lieberman, 2013; Wagner et al., 2011). As such, it is conceivable that mind perception, which is likely a building block of these higher-level social cognitive processes, proceeds on the basis of visual cues alone. However, there is reason to believe that social motives such as group membership may shape the interpretation of visual cues signaling the presence or absence of a mind.

Recent research suggests that many aspects of social perception can be influenced by top-down motivations. For example, motivationally relevant faces (e.g., members of one's own social groups) are often subject to greater processing in face sensitive brain regions, such as the

fusiform face area (FFA) (Van Bavel, Packer, & Cunningham, 2008, 2011). Indeed, social motives have even been found to influence how bottom-up visual features such as race are encoded in the in FFA (Kaul, Ratner, & Van Bavel, 2013). These studies suggest that top-down social motives can influence how bottom-up cues are used in social perception, raising the possibility that mind perception may similarly depend on motivational factors, even when bottom-up visual features are held constant.

Moreover, there is reason to believe that group membership presents a particularly relevant motivation for mind perception. Previous research has found that motivations such as the need for social connection influence mind attribution to inanimate objects and other humans (Epley, Waytz, & Cacioppo, 2007; Waytz, Gray, Epley, & Wegner, 2010). In particular, those who feel lonely are more likely to anthropomorphize pets or gadgets and believe in supernatural beings (Epley, Akalis, Waytz, & Cacioppo, 2008; Epley, Waytz, Akalis, & Cacioppo, 2008), while those who feel socially connected are more likely to attribute fewer mental capacities, e.g. the ability to engage in thought or experience pain, to socially distant others (Waytz & Epley, 2012). Group membership affords individuals the opportunity to fulfill belonging needs (Baumeister & Leary, 1995), as well as several other core motives, including self-enhancement (Tajfel & Turner, 1979), coherence (Abrams & Hogg, 1988), and distinctiveness (Brewer, 1991). To the extent that group membership increases the motivational relevance of in-group members as targets for social affiliation and interaction (Brewer, 1988), social identity may influence the readiness with which people perceive minds behind faces. Indeed, group membership can lead to biases in perception (Bernstein, Young, & Hugenberg, 2007; Van Bavel et al., 2011), evaluation (Otten & Wentura, 1999; Van Bavel & Cunningham, 2009), and behavior (Tajfel, Billig, Bundy,

& Flament, 1971) that favor one's in-group, even in the absence of intergroup conflict or competition.

There is already real world evidence that social identity can impact the attribution of mind and humanity to others. Perpetrators of genocide have been known to dehumanize out-group members—such as the characterization of Jews in the Holocaust or Tutsis in Rwanda as vermin (Haslam, 2006). In less extreme cases, out-group members are "infrahumanized"—judged as less capable of experiencing complex, uniquely human emotions such as nostalgia and compassion (Demoulin et al., 2009; Leyens et al., 2001)—or denied humanity by being seen as animalistic or as automata (Haslam, 2006). Moreover, brain regions regularly involved in social cognition show less activation when people view extreme out-groups, such as the homeless (Harris & Fiske, 2006). People also show lesser empathic responses to out-group as compared to in-group members (Cikara, Bruneau, & Saxe, 2011; Gutsell & Inzlicht, 2012) and these intergroup biases in empathy are associated with differential helping behavior, including the willingness to endure physical pain for in-group but not out-group members (Hein, Silani, Preuschoff, Batson, & Singer, 2010). These studies raise the possibility that social identity may lead to similar patterns of intergroup bias in mind perception. Moreover, the extent to which individuals identify with a group may influence such biases in social perception (Ashmore, Deaux, & McLaughlin-Volpe, 2004; Van Bavel & Cunningham, 2012).

While much research leads to the prediction that people perceive minds less readily in out-group members, a motivational approach to mind perception further suggests that there may also be times when people are better served by considering an out-group member's mental states than by denying them a mind. For instance, when people feel threatened by an enemy, they may be motivated to consider the enemy's strategy and plans. Indeed, greater effectance motivation—

the need for mastery or control over one's environment—has been linked to greater mind attribution, such as anthropomorphizing robots or gadgets by considering them to having minds of their own (Epley et al., 2007; Waytz, Morewedge, et al., 2010). To the extent that out-groups are perceived as threatening, they may heighten effectance needs, which may increase mind perception. Therefore, while people may ordinarily have higher mind perception thresholds—that is, require more humanness in a face to perceive a mind—for out-group faces, intergroup threat may make out-group members highly relevant targets, prompting greater mind perception towards the out-group. Increased vigilance towards out-group minds may occur in the case of physical threats as well as threats to collective in-group goals, values, or power, because in all these cases it is crucial to infer the plans and intentions of out-group members. This may also help distinguish mind perception from evaluation, since mind perception may depend on the importance of finding a mind in friends or in foes regardless of whether they are liked or disliked.

Overview

In three experiments, we examined whether social identity would exert a top-down influence on mind perception. We showed participants morphs that varied from human faces to non-human (inanimate) faces. These faces were described as in-group or out-group members. We examined whether thresholds for perceiving minds differed for in-group and out-group members. We predicted that identifying with a group would lead to more lenient mind perception thresholds for the in-group (Experiments 1 & 2)—especially among highly identified group members (Experiment 2)—but that out-group threat would be associated with more lenient mind perception thresholds for the out-group (Experiment 3).

As a secondary question, we explored whether the effects of social identity were specific to perceiving minds (i.e., whether an entity has the capacity for mental states) as opposed to animacy (i.e., whether an entity is alive; Experiments 1 & 2). Past work found nearly identical thresholds for perceiving animacy and mind (Looser & Wheatley, 2010). However, it is possible that contextual factors can dissociate these dimensions.

Experiment 1: Minimal group membership influences mind perception

The purpose of Experiment 1 was to test whether social identity can exert a top-down influence on mind perception. In order to test the effects of group membership in the absence of intergroup stereotypes or experience, we used a minimal group paradigm in which participants were randomly assigned to one of two minimal groups (Tajfel et al., 1971). Afterwards, participants viewed morphs between human and inanimate faces, which were ostensibly based on models from their in-group or the out-group. Participants rated each image for mind and animacy on a 7-point scale, allowing us to determine whether mind perception thresholds were lower for in-group than out-group members.

Method

Participants. Forty-two New York University undergraduates (13 males[1]; mean age = 20.5; 17 White/Caucasian, 1 African American, 1 Hispanic, 18 Asian, 5 Other[2]) completed

[1] Gender did not interact with group in determining mind perception thresholds ($p = .90$), nor was there a main effect of gender ($p = .64$). Participants' gender did not moderate any of the significant effects reported in Experiments 2 or 3, and so gender is not discussed further.

[2] We did not test the role of race in these experiments, since we were interested in top-down effects of group membership. Race was held constant across the face morphs to rule out any potential effects of expertise. Further, while race might influence mind perception in many contexts, past research has suggested that top-down group categories can override racial categorization (Kurzban, Tooby, & Cosmides, 2001; Van Bavel & Cunningham, 2009; Van Bavel et al., 2008; Van Bavel, Xiao, & Hackel, 2013).

Experiment 1 for course credit. One participant was removed for not completing the study properly.[3]

Stimuli. Our stimuli were a subset of morphed images used by Looser and Wheatley (2010). These morphs were made using FantaMorph software, and are a linear interpolation between well-matched human faces and inanimate faces (e.g. dolls, statues). We used 10 face identities, each with 11 images (10 percent increments along the morph continua), which were broken into two sets (in-group, out-group) of five face identities each (Figure 1).

Procedure. Participants were told that people tend to consistently overestimate or underestimate how many objects they have seen, and that these differences reveal fundamental psychological characteristics of the person (Howard & Rothbart, 1980). Participants then completed a dot estimation task consisting of three displays of random dot configurations presented for three seconds each, with time in between for participants to estimate how many dots they had seen on the previous display. The computer then gave participants random feedback informing them that they were overestimators or underestimators.

Participants were then informed that they would see a series of faces, some of which would look more human and some of which would look less human, and that they would rate how much each was alive or had a mind. To help clarify the concept of "alive," participants were given the example of a snake being alive while a rock is not. To help clarify the concept of "mind," participants were given the example of a human mind differing from that of an animal or robot. Participants were asked to rate how much each face looked alive or like it had a mind

[3] During pilot testing, we developed an *a priori* rule to identify participants who did not perform the task as requested (e.g., participants who clicked randomly through it, and thus had unusable PSE scores). If a participant's average rating for the completely human face was not at least one point higher than his or her rating for the completely inanimate face, we concluded the participant had not been responding properly, and removed that participant. This rule led us to exclude one participant in Experiment 1, none in Experiment 2, and four in Experiment 3.

using a 7-point scale (1 = *definitely has no mind/definitely not alive* to 7 = *definitely has a mind/definitely alive)*. Participants were informed that, to connect quantitative style to face perception, they would see two sets of face images—one based on overestimator faces, and one based on underestimator faces. Participants were told that we were interested in their first impressions.

After completing two sample trials, participants performed mind and animacy ratings. Morph stimuli were divided into two sets of five face identities, one of which was labeled as in-group and one of which was labeled as out-group (labels were counterbalanced across participants). Ratings were completed in four blocks, varying group membership and dimension of judgment (mind and animacy). Dimension order was counterbalanced, and within each dimension, group order (in-group or out-group) was counterbalanced. Within blocks, face order was randomized for each participant. An instruction screen prior to the start of each block informed participants whether the following trials would contain overestimator or underestimator faces and whether they should judge mind or animacy. Critically, the random assignment of group labels to the two face sets across participants guaranteed that any effects of group membership could be attributed to the top-down influence of group membership rather than bottom-up visual features associated with either set of faces.

Each block contained 55 trials, consisting of the five facial identities per face set each morphed along 11 points. On each trial, a morph image appeared in the center of a screen, with the 7-point scale below the face. Trials lasted until participants responded, and were separated by a one second fixation cross in the center of the screen.[4]

Results & Discussion

[4] All materials from the three experiments have been made publicly available at: https://opensciencefframework.org/project/SvY5T/files/.

Response scoring. Participant ratings were linearly transformed to scale from 0 to 1 (0 = no mind/inanimate, 1 = has mind/animate). Ratings from each condition were separately fit with a cumulative normal function to allow calculation of the point of subjective equality (PSE) in each condition. The PSE represents the point at which a face was equally likely to be perceived as having or lacking mind or animacy, respectively. Therefore, PSE values were used in all further analyses as an index of the threshold for perceiving mind or animacy.

Replicating prior findings (Looser & Wheatley, 2010), the points of subjective equality in all four conditions were significantly greater than the midpoint (i.e., .5), indicating that mind and animacy perception thresholds were biased towards the human side of the morph continuum (all *ps* < .001).[5]

We next compared PSE values across conditions for mind and animacy perception using a paired samples t-test. As predicted, when making *mind perception* judgments participants had higher PSE values for the out-group (M = .67) than for the in-group (M = .63), $t(40) = -2.10$, p = .04, d = .33,[6] indicating a higher threshold for perceiving minds behind out-group faces (see Table 1 for all Means and Standard Deviations). Although the results were in the same direction, mean PSEs for *animacy perception* judgments were not significantly different between out-group (M = .68) and in-group (M = .65) members, $t(40) = -1.73$, p = .09, d = .22 .

These results suggest that social identity alters the threshold for mind perception. Although the effects of group membership on animacy were more ambiguous, after assignment to minimal groups, out-group members required more humanness than in-group members to be

[5] Animacy PSEs and mind PSEs were correlated, both when judging the in-group, r = .50, p < .01, and when judging the out-group, r = .70, p < .01.

[6] Cohen's d was computed using the average SD of the two within-subject conditions to provide an intuitive estimate. Using the SD of the difference score resulted in the same rounded estimate.

perceived as having a mind, even in the absence of experience with the groups, intergroup conflict, or stereotypes.

Experiment 2: Collective identification moderates intergroup biases in mind perception

The purpose of Experiment 2 was to examine intergroup mind perception with real-world groups. Participants completed the same task as in Experiment 1, but were told the two sets of face images were based on models from New York University (NYU) and Boston University (BU). These universities have a similar size and status, and are not normally considered rivals. We also tested whether individual differences in collective identification with one's group moderate biases in mind perception. We hypothesized that participants would show an intergroup bias in mind perception, and that participants who were highly identified with NYU would be more likely to show this pattern of bias.

Method

Participants. Thirty undergraduate NYU students (five males; mean age = 19; 11 White/Caucasian, 2 Hispanic, 10 Asian, 7 Other) completed Experiment 2 for course credit.

Stimuli. The stimuli were the same as those in Experiment 1.

Procedure. Participants completed the same task, but were told that they would see two sets of face images, one of which was created using NYU affiliates as models and one of which was created using BU affiliates as models. Participants were told we were validating both face sets for use in future research, and were asked to rate the animacy and mind of each face. University affiliation of faces was cued with an instruction screen that appeared before each block featuring the university name and logo. All other instructions and procedures for the face rating task were the same as in Experiment 1.

Collective identification. After completing the face rating task, participants completed a measure of collective identification with the in-group (Leach et al., 2008) (α = .98). The scale included statements measuring the extent to which participants felt invested in and defined themselves as members of the NYU community. Participants indicated how strongly they agreed with 14 statements using a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*) (*M* = 3.42, *SD* = .73).

Results & Discussion

Response scoring. PSE values for each condition were calculated as described in Experiment 1.

Collective identification moderates intergroup bias in mind perception. Replicating Experiment 1, PSE values in each condition were greater than .5 (*ps* < .01)[7].

Because we had a within-subjects categorical predictor (group membership) and a between-subjects continuous predictor (collective identification), we fit a regression using generalized estimating equations (GEE) (Liang & Zeger, 1986), which accounts for repeated measures. Our factorial model tested the impact of group membership (-1 = in-group, 1 = out-group), collective identification (mean-centered), and their interaction on mind perception thresholds.

Replicating the results in Experiment 1, we found a main effect of group membership, *b* = .04, *SE* = .02, *Wald* X^2 = 6.21, *p* = .01, indicating that participants had higher thresholds for perceiving minds behind out-group faces (see Table 1 for Means). Additionally, we found the predicted interaction between target group membership and collective identification, *b* = .05, *SE* = .02, *Wald* X^2 = 5.47, *p* = .02. As shown in Figure 3, participants with high collective

[7] Animacy PSEs and mind PSEs were not correlated in Experiment 2, both when judging the in-group, *r* = .01, *p* = .94, and the out-group, *r* = .31, *p* = .09.

identification were more likely to have higher thresholds for out-group as opposed to in-group members.

We examined simple effects by re-centering collective identification one standard deviation above and below its mean (Aiken & West, 1991). Analyses revealed that high-identifiers had higher thresholds when judging mind for out-group members than for in-group members, $b = .08$, $SE = .03$, $Wald\ X^2 = 6.67$, $p = .01$. In contrast, low-identifiers showed no differences between in-group and out-group thresholds, $b = .001$, $SE = .01$, Wald $X^2 = .003$, $p = .95$.

Finally, to test the simple slope of identification when judging in-group or out-group members, we recoded group membership as a dummy variable, varying whether in-group or out-group served as the reference group. The simple slope of identification was not significantly different from zero for the in-group, $b = -.06$, $SE = .05$, Wald $X^2 = 1.62$, $p = .20$, or for the out-group $b = .05$, $SE = .03$, Wald $X^2 = 2.03$, $p = .15$. Analyses on animacy perception PSEs revealed no effect of group membership, $b = -.02$, $SE = .01$, $Wald\ X^2 = 2.09$, $p = .15$ or the interaction, $b = -.01$, $SE = .01$, $Wald\ X^2 = .78$, $p = .38$.

In all, these results suggest collective identification moderates intergroup bias in mind perception: students who identified more highly with NYU were more likely to show intergroup bias.

Experiment 3. Intergroup threat facilitates out-group mind perception.

The purpose of Experiment 3 was to examine the impact of intergroup threat on out-group mind perception. Threatening out-groups present motivationally relevant targets for mental state attribution, as perceivers may need to monitor their intentions and predict their actions. We therefore hypothesized that in-group identification and out-group threat would

influence mind perception in opposing directions. Specifically, we hypothesized that in-group identification would be associated with relatively more stringent thresholds for out-group as opposed to in-group members, but that greater perceived out-group threat would be associated with more lenient mind perception thresholds for out-group members. To test this question, we assessed in-group and out-group mind perception thresholds amongst Democrats and Republicans living in the United States—two competitive groups likely to perceive each other as threatening in the midst of the 2012 presidential election—and measured perceived out-group threat. Since social identity was not related to animacy ratings in Experiments 1 and 2, we did not collect animacy ratings in Experiment 3.

Method

Participants. Sixty-eight Democrat and Republican participants (24 male; 40 Democrats, 28 Republicans; mean age = 31) living in the United States were recruited via Mechanical Turk in exchange for $0.40.[8] Mechanical Turk offers greater political and demographic diversity than the typical undergraduate participant pool. Data were collected in May 2012 in the run up to the general election. In addition to the exclusion rule used in all studies, we included two attention check questions in Experiment 3 to ensure online participants were paying attention throughout (Mason & Suri, 2012). We removed data from 12 participants (6 Democrats, 6 Republicans) who failed attention checks and/or did not complete the study properly. The demographic breakdown of the final sample was 40 White/Caucasian, 8 African American, 3 Hispanic, 3 Asian, 2 Native American.

Stimuli. The stimuli were the same as Experiments 1 & 2.

[8] To avoid suspicion about the nature of the intergroup task, we allowed independents to complete the study rather than pre-screening for Democrats and Republicans. A total of 138 people completed the online survey. Since we were only interested in participants with a clear party in-group and out-group, we only analyzed data from the 68 Democrats and Republicans, defined through self-reported party affiliation ("Democrat"/"Republican"/"Other") collected after the face rating task.

Procedure. Participants were informed that they would complete a study about how people perceive minds. Participants were told that they would rate face images based on the faces of volunteer models from the NYU Democrats and NYU Republicans.

Participants rated the same two sets of morph images from our previous studies in two blocks (in-group mind perception and out-group mind perception). Before each block, participants saw a cue thanking members of the NYU Democrats or NYU Republicans for serving as models for the upcoming face images, and featuring the logo of the party specified. Group labels, party order, and face set order were all counterbalanced across participants, and face order was randomized for each participant within blocks. After completing their ratings, participants reported their own political party affiliation, and completed a version of the Leach et al. (2008) collective identification scale tailored to their party (α =.92) (M = 3.55, SD = .69). Finally, Republicans (Democrats) were asked "To what extent do you think Democrats (Republicans) pose a threat to Republicans (Democrats)", using a 7-point scale (1 = *not at all* to 7 = *very much*) (M = 4.39, SD = 1.65).

Results & Discussion

Response scoring. Based on participant party affiliation, blocks were coded as "in-group" or "out-group" for each participant, allowing us to represent group differences with one factor (Target Group Membership) instead of two (Participant Party × Target Party). Responses were then transformed into PSE values as in Experiments 1 and 2. Political party of the participant (i.e., Democrat or Republican) did not impact any analyses reported below.

Collective identification moderates in-group bias in mind perception. As in prior experiments, average PSE values for each condition (in-group and out-group) were significantly

greater than .5 ($ps < .01$)[9]. We fit a regression (using GEE) to test the impact of target group membership (-1 = in-group, 1 = out-group), in-group identification (mean centered), out-group threat (mean-centered), and their interactions on mind perception judgments, using a factorial model. Entering all predictors into one factorial model allowed us to examine the interactions of identification and threat with group membership, while adjusting for variance associated with the other predictor, its interactions, and the three-way interaction.

Since we predicted that in-group identification and out-group threat would have opposing effects on mind perception thresholds, we did not expect a main effect of group membership, nor did we find one, $b = .004$, $SE = .006$, $Wald\ X^2 = .35$, $p = .55$. Replicating Experiment 2, the target group membership $\times$ collective identification interaction, $b = .02$, $SE = .01$, $Wald\ X^2 = 3.92$, $p < .05$, indicated that high-identifiers were more likely to have relatively more stringent thresholds for perceiving minds behind out-group than in-group faces (see Figure 4a).

Consistent with the pattern of results in Experiment 2, simple effects analyses revealed a marginally significant difference between thresholds for in-group and out-group members among high-identifiers, $b = .015$, $SE = .0087$, $Wald\ X^2 = 2.808$, $p = .09$, Low-identifiers showed no difference between in-group and out-group PSE values, $b = -.007$, $SE = .0081$, $Wald\ X^2 = .907$, $p = .38$. Further, the simple slope of the effect of identification on in-group judgments was significantly different from zero, $b = -.046$, $SE = .0221$, $Wald\ X^2 = 4.314$, $p = .04$, indicating that higher identification scores were associated with lower thresholds for in-group members. In contrast, the simple slope of the effect of identification on out-group judgments was not significantly different from zero, $b = -.014$, $SE = .0232$, $Wald\ X^2 = .388$, $p = .53$. These results

[9] Collective identification and out-group threat were not significantly correlated, $r = .09$, $p = .51$.

suggest that, in Experiment 3, collective identification was associated with more lenient mind perception thresholds for the in-group.

Out-group threat facilitates out-group mind perception. As predicted, an out-group threat × target group membership interaction, b = -0.01, SE = .004, $Wald\ X^2$ = 7.84, p < .01, indicated that participants who perceived high out-group threat were more likely to have more lenient thresholds for out-group members (see Figure 4b).

To probe the effect of threat, we examined the simple slope of the effect of threat when judging the out-group, which was significantly different from zero, simple b = -.025, SE = .01, $Wald\ X^2$= 8.27, p < .01. In contrast, the simple slope of the effect of threat when judging in-group members was not significantly different from zero, simple b = -.005, SE = .01, $Wald\ X^2$ = .28, p =.60. These results indicate that threat was associated with more lenient mind perception thresholds when judging the out-group, but not the in-group.

Overall, those who perceived *low* out-group threat (calculated one SD below the mean) had lower thresholds for in-group members than out-group members, b = .018, SE = .01, $Wald\ X^2$ = 4.01, p < .05, replicating the previous pattern of intergroup bias. However, those who perceived *high* out-group threat (calculated one SD above the mean) had marginally lower thresholds for the out-group than for the in-group, b = -.014, SE= .008, $Wald\ X^2$= 3.13, p =.077, almost completely reversing the pattern of intergroup bias observed in the previous experiments. Although this out-group advantage under high threat was only marginally significant, our claim is not that threatening out-groups are perceived as having a mind *more* readily than in-groups per se, but that out-group threat *facilitated* out-group mind perception. As described above, the significant simple slope of threat among out-group members, but not among in-group members, is consistent with this claim.

No three-way interaction was observed between target group membership, in-group identification, and out-group threat ($p = .20$), which suggests that collective identification and out-group threat may have had separate, additive interactions with target group membership.

Taken together, we replicated the finding that people who were highly identified with their group were more likely to show an intergroup bias in mind perception. At the same time, these results suggest that intergroup threat can facilitate out-group mind perception: people who saw the other party as a threat were more likely to have lenient mind perception thresholds for out-group members.

General Discussion

The ability to perceive minds behind faces is crucial for successful human interaction. While previous research demonstrated that people use the physical features of faces to determine if a face has a mind (Looser & Wheatley, 2010), we found evidence that social identity can exert a top-down influence on the threshold for perceiving minds. Across three experiments, social identity, collective identification, and intergroup threat were associated with the threshold at which people perceived a mind behind a face. In Experiment 1, participants assigned to minimal groups had more stringent thresholds for perceiving minds behind out-group faces as opposed in-group faces. Experiment 2 replicated this pattern with real-world groups while also demonstrating that collective identification with the in-group moderates this bias: NYU affiliates who were highly identified with their university were most likely to show an intergroup bias in mind perception. Experiment 3 replicated the relationship between intergroup bias and collective identification with political groups, while also demonstrating that perceived out-group threat may moderate the relationship between group membership and mind perception. Specifically, we found that Democrats and Republicans who perceived out-group threat had more lenient mind

perception thresholds for *out*-group members. This research suggests that mind perception is a dynamic process, dependent not only on physical features of faces but also on relevant contextual information such as social identity and out-group threat.

These findings indicate that group motivations can influence mind perception. Social cognitive models of person perception suggest that in-group members are more motivationally relevant to perceivers, and are thus more likely to be individuated and processed in greater depth (Brewer, 1988; Fiske & Neuberg, 1990). In particular, in-group members may represent more likely targets for social interaction or fulfillment of social affiliation needs, which have been shown to impact mind attribution (Epley, Akalis, et al., 2008; Epley, Waytz, et al., 2008; Waytz & Epley, 2012). Notably, the mere assignment of participants to minimal groups in Experiment 1 altered mind perception thresholds for in-group and out-group members, even in the absence of intergroup conflict or stereotype content. These results are consistent with Self-Categorization Theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), which argues that currently salient self-representations guide social perception (see Van Bavel & Cunningham, 2011 for a more detailed discussion). Additionally, the finding that collective identification influences mind perception thresholds suggests that mind perception may be influenced by the strength of particular group identities. Future research is needed to determine if the difference in mind perception thresholds is driven by in-group relevance or out-group derogation. Additionally, while we tested core elements of intergroup processes (social identity, collective identification, intergroup threat) across three groups, it is possible that the differences between university and political affiliations led to slightly different patterns of simple effects across Experiments 2 and 3. In Experiment 2, high identifiers showed a significant difference between in-group and out-group thresholds, while there were no significant simple slopes of identification

for in-group or out-group ratings. In Experiment 3, the simple slope of identification was significant for in-group judgments, while the difference between in-group and out-group amongst high-identifiers was marginally significant. As all effects ran in the same direction, any differences must be interpreted with caution. However, it is possible that in threatening contexts, in-group identification may become more relevant to the perception of in-group members, as opposed to the differential between in-group and out-group, as out-group threat may become the more relevant factor for determining out-group judgments. Future work would do well to explore the differences between group contexts and tease apart the role of in-group favoritism versus out-group derogation. Nonetheless, it seems clear that group membership can shape the ease with which people perceive minds in others.

Further, we found that intergroup threat can actually facilitate out-group mind perception. Specifically, Democrats and Republicans who perceived the out-group as threatening also perceived minds more readily behind out-group faces—reversing the ordinary pattern of intergroup bias and suggesting that mind perception is responsive to social motives. Our measure of threat did not disambiguate whether participants perceived a threat to in-group goals, values, or power, which may provide interesting exploration for future work. However, the findings suggest that the extent to which people attribute minds to out-group members may depend on the importance of getting inside the out-group mind. This result further suggests that mind perception can be dissociated from intergroup evaluation: groups likely to be evaluated negatively may still be perceived as having minds, at least under some circumstances.

At first glance, this finding may seem surprising given previous work on dehumanization, which suggests that threatening social groups—specifically, those seen as threatening the collective goals of one's in-group—are dehumanized and mistreated (Glick, 2005). However,

targets of dehumanization are often specifically those groups perceived as powerful and acting intentionally to harm the in-group (Glick, 2005)—within the Stereotype Content Model, they may be envied and/or competitive groups perceived as high on competence and low on warmth (Fiske, Cuddy, Glick, & Xu, 2002). Ironically, these characteristics actually do imply of the presence of a mind with the capacity to act agentically. As such, an important direction for future work will be to examine how different components of mind are impacted by perceived threat. In particular, research on mind perception has found that people often think about minds on two dimensions: *agency*, implying abilities related to agentic engagement in the world (e.g. thinking, planning), and *experience*, implying abilities for passive experiential states (e.g. feeling pleasure or pain) (H. M. Gray et al., 2007). It is possible that people who perceive out-group threat may be more likely to perceive high out-group agency, but not out-group experience. Such a dissociation would allow partisans to respond adaptively to perceived out-group plans and strategies (e.g., perceiving a threatening out-group as agentic) without enhancing empathy (e.g., dehumanizing the threatening out-group in terms of experience). In contrast, low competence/low warmth groups such as the homeless, who are also believed to be dehumanized (Harris & Fiske, 2006), may be dehumanized in terms of both agency and experience. Intergroup mind perception along these two dimensions may have important implications for intergroup empathy, cooperation, or conflict. It is our hope that these studies lay the groundwork for future research exploring downstream consequences of biased mind perception.

These experiments demonstrate that top-down influences shape the interpretation of bottom-up visual cues in mind perception. However, our task was not designed to assess the automaticity of theses processes or compare different components of the processing stream. Past research suggests that top-down motives can influence even rapid, ostensibly automatic

components of social perception (Teufel, Fletcher, & Davis, 2010), influencing face perception within 100-200 ms of face processing (Cunningham, Van Bavel, Arbuckle, Packer, & Waggoner, 2012; Ratner & Amodio, 2012). Therefore, future work should examine whether these top-down influences on mind perception occur relatively early within the perceptual processing stream. These methods will help distinguish whether identity concerns alter mind perception through changes in the perceptual system or more downstream cognitive processes.

Finally, although humans and dolls differ in terms of both animacy and mind, we found that only mind perception was reliably influenced by group membership. These differences may arise because animacy and mind carry different meanings and motivational precursors: animacy suggests that an entity may be *biologically* relevant (e.g., an animate entity can move), while mind suggests an entity may be *socially* relevant (e.g., an entity with a mind may satisfy belongingness needs or challenge effectance needs; Epley, Waytz, & Cacioppo, 2007). While caution is necessary in interpreting null results, this distinction may explain why only mind perception judgments were reliably influenced by group membership and non-physical out-group threat—both of which relate to social motivations. Future work should test whether biological motivations may influence thresholds for animacy perception.

Conclusion

The current research suggests that social identity can alter the detection of a mind behind a face. In other words, social identity may not only shape higher-level attributions of mental abilities (Leyens et al., 2001), but also basic perceptual thresholds. In daily life, people may more readily perceive minds and mental states of in-group members, which could have profound consequences for perspective-taking and empathy. However, motivations stemming from out-group threat can reverse this pattern, heightening the motivation of perceivers to understand the

intentions of out-group members. The present research suggests that social and motivational aspects of basic mind perception are crucial for understanding and developing interventions to improve intergroup relations.

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Responsibilities: LH, CL, and JVB designed studies, LH analyzed studies with input from CL and JVB; LH, CL, and JVB wrote the manuscript.

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Figure 1. Six sample morph stimuli (of 11) for two morph identities, rendered in black and white (participants saw morphs in color). Participants saw morphs between well-matched human and inanimate faces along 11 equidistant points. (See Supplementary Figure 1 for more samples.)

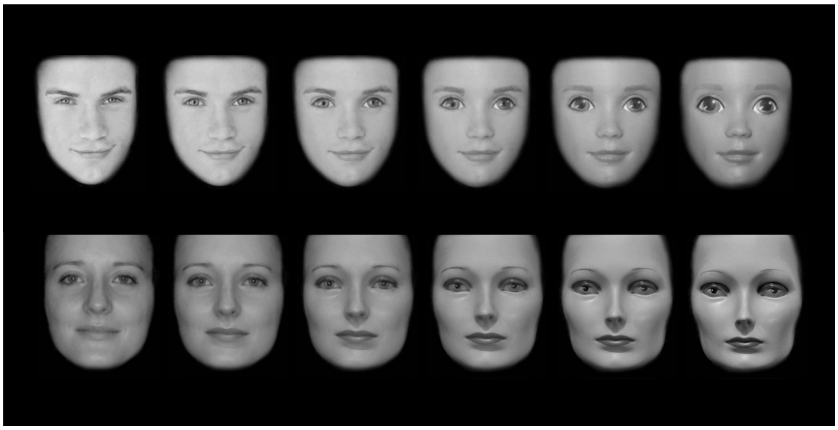

Figure 2a. Mind perception thresholds for in-group and out-group faces (Experiment 1). The darker lines represent average ratings of mind for in-group members and out-group members at each point along the morph continuum. The lighter-colored regions around the lines represent standard error. The asterisk marks a significant difference between the average point of subjective equality (PSE) for in-group and out-group faces, such that the average PSE was lower (i.e., more lenient) for in-group as opposed to out-group faces

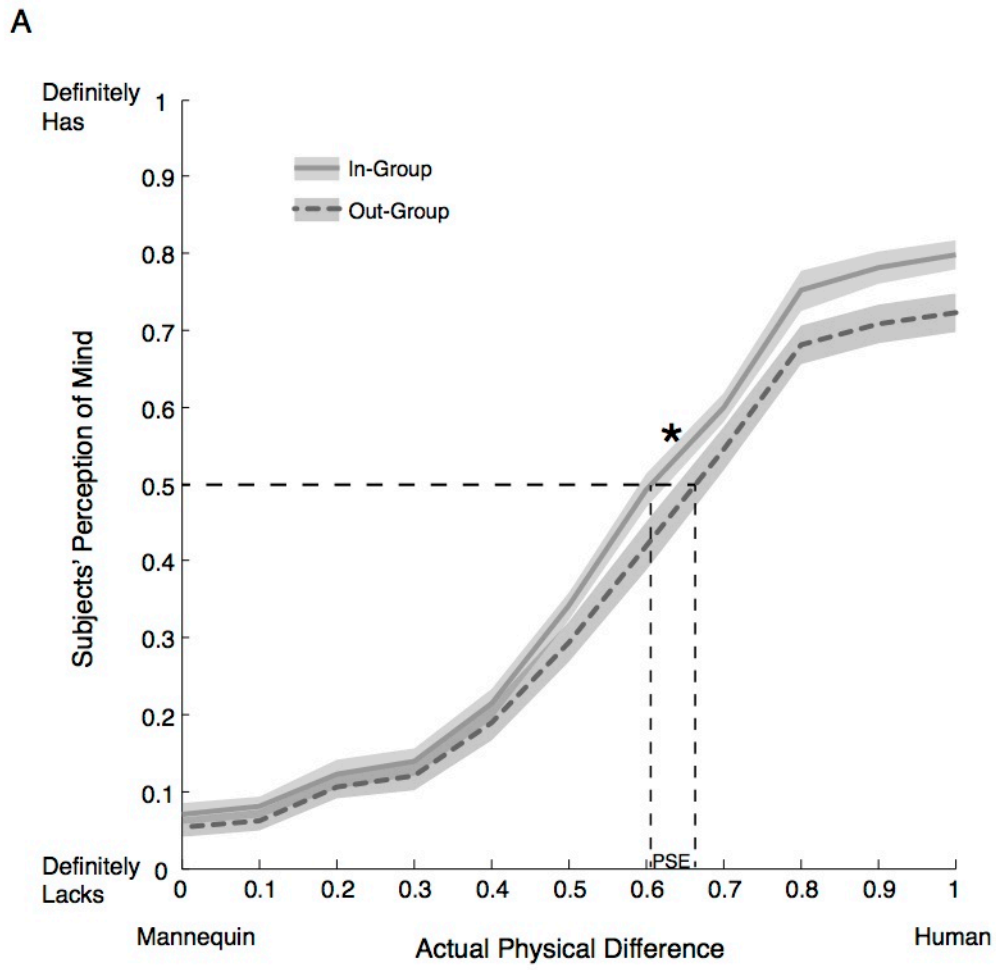

Figure 3. Collective identification (ID) × group interaction on mind perception thresholds (Experiment 2). High and low identifiers are plotted one standard deviation above and below the mean, respectively. Those who identify highly with the in-group are more likely to show lower (i.e., more lenient) thresholds for in-group as opposed to out-group members.

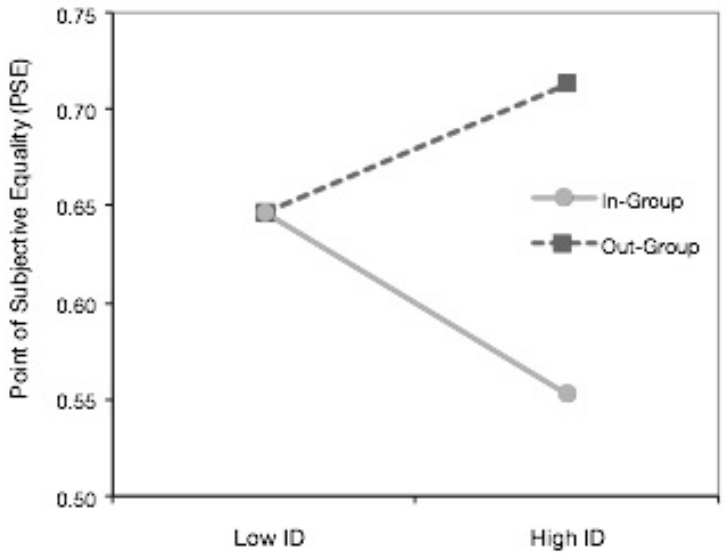

Figure 4a. Collective Identification (ID) × group interaction on mind perception thresholds (Experiment 3). High and low identifiers are plotted one standard deviation above and below the mean, respectively. Those who identify highly with the in-group are more likely to show lower (i.e., more lenient) thresholds for in-group as opposed to out-group members. **b.** Out-group threat × group membership interaction on mind perception thresholds (Experiment 3). High and low perceived out-group threat is plotted one standard deviation (SD) above and below the mean, respectively. Participants who perceive out-group threat are more likely to show lower (i.e., more lenient) mind perception thresholds for out-group members.

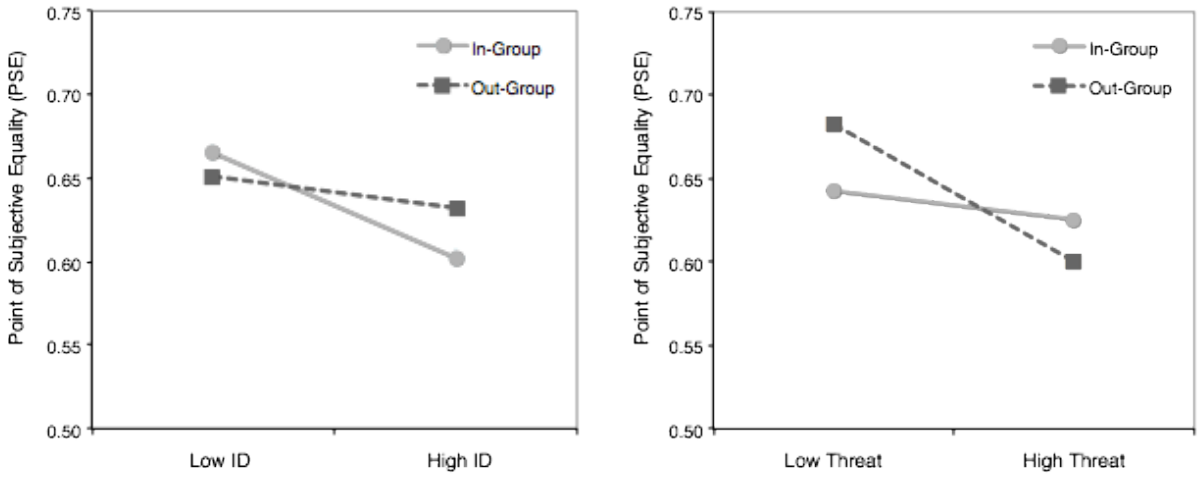

Table 1. *Mean Mind Perception and Animacy Perception PSEs for In-Group and Out-Group (Experiments 1 & 2).*

	In-Group	Out-Group
Dimension	*M* (*SD*)	*M* (*SD*)
Study 1: Mind[a]	.63 (.10)	.67 (.14)
Study 1: Animacy	.65 (.13)	.68 (.12)
Study 2: Mind[a]	.60 (.10)	.68 (.14)
Study 2: Animacy	.67 (.10)	.64 (.08)

[a]For these dimensions, the difference between in-group and out-group was statistically significant ($p < .05$).