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The Face of Humanity: Configural Face Processing Influences Ascriptions of Humanness

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Abstract

Across three studies, we test the hypothesis that the perceived "humanness" of a human face can have its roots, in part, in low-level, feature-integration processes typical of normal face perception—configural face processing. We provide novel evidence that perceptions of humanness/dehumanization can have perceptual roots. Relying on the well-established face inversion paradigm, we demonstrate that disruptions of configural face processing also disrupt the ability of human faces to activate concepts related to humanness (Experiment 1), disrupt categorization of human faces as human (but not animal faces as animals; Experiment 2), and reduce the levels of humanlike traits and characteristics ascribed to faces (Experiment 3). Taken together, the current findings provide a novel demonstration that dehumanized responses can arise from bottom-up perceptual cues, which suggests novel causes and consequences of dehumanizing responses.

Keywords

face perception, configural processing, dehumanization, mind perception

Ascribing personhood to, or withholding personhood from, another human is perhaps the most essential act of social cognition (Dennett, 1996). The consequences of ascribing or withholding humanity are extraordinary. Ascribing humanity brings others into the moral community (Opotow, 1990), forestalling harmful treatment, and facilitating fairness and empathy (Čehajić, Brown, & Gonzalez, 2009), whereas withholding humanity leads to the converse. Dehumanization can trigger discrimination (Pereira, Vala, & Leyens, 2009) and aggression (Viki, Osgood, & Phillips, 2013). Moreover, when humanity is withheld, persons are not ascribed the full human range of emotions (Leyens et al., 2003). Perhaps not surprisingly, the tendency to withhold humanity from others can facilitate intergroup conflict and harmful treatment (Haslam, 2006, 2014).

Despite major developments in theory on dehumanization and related phenomena (infrahumanization, objectification, and mind perception; see Bain, Vaes, & Leyens, 2014), most recent work focuses on ascribing personhood as a motivated, top-down process, with beliefs and motives about the self and others influencing ascriptions of humanness. In the current work, we link the ascription of humanity to bottom-up *perceptual* processes—we demonstrate that ascribing humanity to others can also have its roots in the perceptual processes employed in normal face encoding. We hypothesize that *configural face processing*, a feature-integration process typically reserved for the faces of in-group members (Hugenberg & Corneille, 2009; Michel, Rossion, Han, Chung, & Caldara, 2006; see also Ratner & Amodio, 2013), may serve as a trigger for ascriptions of humanity: When a face is processed configurally, it is experienced as more human.

Dimensions of Humanness: Ascribing and Withholding Humanity

Although the consequences of dehumanization are troubling, the cognitive processes underlying ascribing and withholding personhood have only recently received scrutiny. Whereas a review of the theories of ascribing humanlike faculties is beyond the scope of the current work (see Haslam, 2014), there is some consistency in how multiple research traditions—including the infrahumanization (Leyens et al., 2000), dehumanization (Haslam, 2006), and mind perception (Waytz, Gray, Epley, & Wegner, 2010) literatures—explain ascriptions of humanity. These perspectives focus on how humans are seen as possessing *sophisticated capacities* that are distinct from

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other animals (e.g., dogs), while having an *emotional responsiveness and experiential capacity* that makes humans distinct from objects such as automata or machines. This distinction between "unthinking" animals and "unfeeling" machines is reflected in how people are dehumanized. Humans seen as being emotionally responsive and socially engaged but lacking rationality, morality, and civility are seen as animallike, whereas humans seen as rational and civil but lacking emotional responsiveness are seen as machinelike (Loughnan & Haslam, 2007). Importantly, ascriptions of humanity are sensitive to top-down factors, such as intergroup motives (Hackel, Looser, & Van Bavel, 2014), motives for social connection (Epley, Waytz, & Cacioppo, 2007; Powers, Worsham, Freeman, Wheatley, & Heatherton, 2014), or motives to derogate others (Haslam, 2014).

Here, we propose that signals of others' humanness can also arise from the bottom-up perceptual process of configural face encoding. The possibility that perceptual or bottom-up effects influence the perception of personhood is largely absent from most models of dehumanization and receives little discussion in well-established models of mind perception. Indeed, only recently have scientists begun to investigate how faces trigger the experience that others are human (see Looser & Wheatley, 2010). In the current work, we predict that perceptual processes employed in face perception can generate just such signals of humanity, illustrating not just that bottom-up effects can occur but also a specific process by which they emerge: configural face processing.

Configural Processing of Faces

Faces are special. Humans process faces in a manner dissimilar from virtually all other stimuli by integrating the individual features of the face into a unified Gestalt, a process known as configural face encoding (Maurer, Le Grand, & Mondloch, 2002).[1] Objects and nonhuman faces are not processed configurally in most situations (Tanaka & Gauthier, 1997). This integration of facial (but not object) features into a single Gestalt can help explain why humans have relative ease recognizing human faces (Tanaka & Gordon, 2011).

Various techniques have been used to investigate configural face processing, but the gold standard in the scientific literature is the *face inversion* technique (see Figure 1). In Yin's (1969) groundbreaking demonstration, face inversion undermined memory for faces but not for nonface objects such as aircraft and houses. Inverting a face maintains the features in the face (the eyes, nose, and mouth still exist) but disrupts the eyes-over-nose-over-mouth configuration of the features, making it well suited to isolate the effects of configural processing (Rossion & Gauthier, 2002; Valentine, 1988).

Therefore, we relied on face inversion to manipulate configural processing in this research. This paradigm affords multiple advantages, not the least of which is that it is the best-validated means of manipulating configural face processing. It also affords the advantage of disrupting configural processing without actually disrupting the features of the face itself (cf. scrambled features or composite face techniques; see Richler, Cheung, & Gauthier, 2011; Zhao et al., 2014). Although such techniques do manipulate configurality, scrambling features and splitting a face also disrupt its humanness. Humans do not exist with eyes where a chin should be, and humans with a bifurcated skull are lacking key components of humanness (e.g., their life). However, an inverted human is still, logically speaking, fully human.

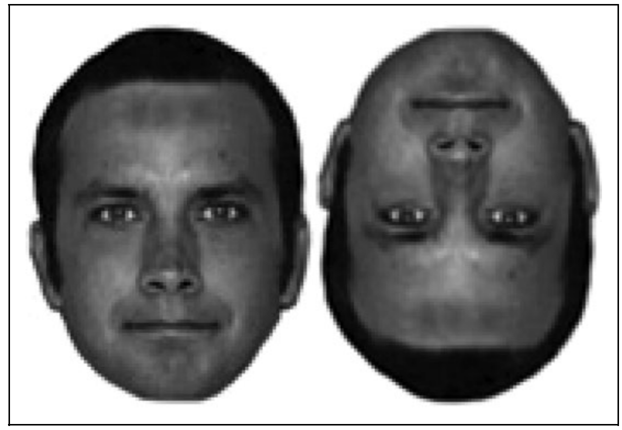

Figure 1. Upright but not inverted faces are processed configurally.

Configural Face Processing as a Cue for Humanity

Although the act of ascribing or withholding humanlike capacities is multiply determined, we propose that these ascriptions can have perceptual roots. Because no stimulus is more uniquely human than the human face, and because the face is a focal point in social cognition (Macrae & Quadflieg, 2010), we argue that face processing is inextricably bound with humanness (see also Looser & Wheatley, 2010; Wheatley, Weinberg, Looser, Moran, & Hajcak, 2011). Specifically, because human faces are processed configurally, in a manner distinct from other objects, we argue that configural processing is strongly associated with humanity and may therefore serve as a *cue for humanity*. Although to our knowledge there are no direct tests of this hypothesis, there is converging indirect evidence that configural face processing may cue humanity and conversely that a lack of configural face processing may trigger dehumanization.

Dehumanized faces are not processed configurally. Multiple findings indicate, albeit indirectly, that faces of dehumanized groups may not be processed configurally. First, while configural processing typically does occur for human faces, not all human faces are processed configurally to the same extent. Instead, different types of faces are afforded differential levels of configural processing. First, only real but not fake human faces sustain neural activity beyond early feature detection and integration processes (see Wheatley et al., 2011). Further, one consistent finding is that racial out-groups are afforded less configural face processing than are racial in-groups (e.g., Michel et al., 2006). Similarly, facially stigmatized individuals may also elicit less configural face processing. Facial stigmas attract visual attention to the specific stigmatizing feature (feature-based processing; Madera & Hebl, 2012), which can undermine perceivers' ability to process the face (Ackerman et al., 2009). Thus, our hypotheses begin with the observation that configural processing is attenuated for racial out-groups and for members of stigmatized groups—the very groups who are likely to be dehumanized in naturalistic contexts (e.g., Goff, Eberhardt, Williams, & Jackson, 2008).

Second, research also supports the link between dehumanization and processing people as objects. For example, Harris and Fiske (2006) demonstrated that the faces of stigmatized groups elicit lowered levels of activation of the medial prefrontal cortex, a brain region that mediates social judgments (Harris, McClure, Van den Bos, Cohen, & Fiske, 2007). Recently, Bernard, Gervais, Allen, Campomizzi, and Klein (2012) extended the link between person versus object processing and dehumanization to the objectification of women. Using an inversion paradigm, they demonstrated that sexualized women were processed more like objects and less like humans, as compared to sexualized men. Although this work uses bodies rather than faces, Bernard and colleagues' evidence does demonstrate that objectified women are not processed like people typically are.

Configural processing triggers ascriptions of humanity. There is also indirect evidence across disciplines that configural face processing may trigger ascriptions of humanity. Making nonhuman stimuli appear facelike spontaneously elicits ascriptions of humanlike traits to those stimuli (Epley et al., 2007). This tendency for facelike stimuli to be anthropomorphized has been demonstrated in scientific literatures ranging from robotics to consumer preferences. For example, robots with facelike characteristics are typically ascribed more humanlike traits than are robots without them (see Duffy, 2003). Further, manipulations that disrupt configural processing of robot faces also interfere with the anthropomorphism of robots. Osawa, Matsuda, Ohmura, and Imai (2010) found that robots with a facelike configuration were visually scanned like faces typically are (with a joint focus on eyes and mouth), whereas inverted face orientation directed participants' gaze toward the mouth of the robot (i.e., feature-based processing). This is an important observation, given that eyes appear important in generating perceptions of animacy (Looser & Wheatley, 2010), in triggering configural processing (Young, Slepian, Wilson, & Hugenberg, 2014), and in generating superior face encoding (Kawakami et al., 2014).

In consumer research, generating facelike product stimuli also appears to elicit spontaneous anthropomorphic responses. For example, the front end of automobiles, which commonly resembles faces—headlights mapped to eyes and grills mapped to mouths—elicit responses similar to faces. Headlight-to-grill relationships resembling mature faces elicit anthropomorphized trait inferences of power relative to headlight-to-grill relationships resembling immature faces (Windhager et al., 2012). In short, when nonhuman stimuli are presented having facelike configurations, they elicit spontaneous anthropomorphizing responses.

Current research. In the current research, we directly investigate how configural face processing can trigger ascriptions of humanity. When faces are processed configurally, we propose that this can trigger the activation of human-related concepts, facilitate the categorization of targets as human, and even lead perceivers to believe an individual has more humanlike characteristics. Conversely, when that typical method of processing faces is disrupted, we hypothesize that this may fail to trigger the experience of "humanness," leading to (relative) dehumanization of others.

Experiment 1

Experiment 1 was designed as an initial test of the hypothesis that disrupting configural face processing can disrupt the activation of concepts related to humanity. In this experiment, participants completed a modified lexical decision task (LDT). In each trial, participants first saw a face presented either upright or inverted for 100 ms, followed immediately by a letter string that was either a word or a pronounceable nonword. Critically, we manipulated within-subjects whether the words in the LDT were related to humans or machines. Drawing on our hypothesis that configural face processing triggers humanness, we predicted that upright faces, but not inverted faces, would facilitate recognition of human-related words but not machine-related words or nonwords.

Method

Participants and Design

A power analysis using *G**Power to detect a small effect ($\eta_p^2 = .02$), assuming a .8 correlation between the measures targeted an N of 52 for 95% power. Fifty-one White undergraduates completed a study with a 3 (word type: human, machine, nonword) $\times$ 2 (face prime orientation: upright, inverted) within-subjects design.

Stimuli

Five grayscale images of the faces of White, college-aged males displaying neutral expressions and direct gaze were presented either upright or inverted.[2] Twelve words served as targets for the LDT. Six words related to humanity (human, person, individual, soul, personality, and people) and six words related to machines (machine, computer, robot, device, engine, and locomotive) were used. These were matched across condition for average length (seven letters per word) and pretested on a 7-point scale of relatedness to the concept "human" (1 = *not at all* and 7 = *very much*). Pretesting ($N = 10$) indicated that the human-related words were more human related ($M = 6.07$, 95% CI [5.57, 6.57], $SD = 0.80$) than were the machine-related words ($M = 1.82$, 95% CI [1.43, 2.21], $SD = 0.63$),

$t(9) = 15.97$, $p < .001$. We also employed 12 pronounceable nonwords matched for average length with the words.

Procedure

Participants completed a modified LDT via computer. This task consisted of 192 trials. Each trial began with a fixation cross (1,000 ms), which was occluded by a 100 ms face prime, after which a letter string was presented. Letter strings remained onscreen until participants responded. Participants indicated whether the letter string presented was a word or nonword via keystroke, as quickly and accurately as possible. Face prime orientation was manipulated within subjects, creating 96 upright face and 96 inverted face trials. Word type was also manipulated within subjects, creating 96 word and 96 nonword trials. In the 96 word trials, half of the words presented were related to humans and half were related to machines.

Results and Discussion

Of interest was whether face inversion affected the activation of human-related concepts but not machine-related concepts. To test this, we first eliminated response latencies for incorrect responses, latencies faster than 300 ms, and latencies slower than 1,500 ms (10.2% of trials) based on a priori criteria (see Boucher & Rydell, 2012). We then averaged response latencies for the six different trial types of the 3×2 design, separately for each participant.

Given that face inversion disrupts spontaneous configural processing, of interest was whether inverted faces elicit slower responses to human-related words (but not machine or nonwords), relative to upright faces. To investigate this, the response latency data were submitted to a 3 (word type) $\times$ 2 (face prime orientation) repeated-measures analysis of variance (ANOVA). As shown in Figure 2, this ANOVA revealed the predicted two-way interaction, $F(2, 100) = 3.48$, $p = .035$, $\eta_p^2 = .065$.

Decomposing this interaction separately for word type indicates that, as predicted, human-related words were classified more quickly after upright face primes ($M = 586.08$, 95% CI [567.90, 604.25], $SD = 64.62$) than after inverted face primes ($M = 602.12$, 95% CI [582.37, 621.87], $SD = 70.23$), $F(1, 50) = 12.39$, $p = .001$, $\eta_p^2 = .199$. However, there was no effect of face prime orientation on machine words, $F(1, 50) = 0.11$, $p = .738$, $\eta_p^2 = .002$, or on nonwords, $F(1, 50) = 0.13$, $p = .717$, $\eta_p^2 = .003$. Alternately, decomposing the interaction separately for upright and inverted face primes indicates that classification of human-related words was facilitated relative to machine words in the upright, $F(1, 50) = 14.11$, $p < .001$, $\eta_p^2 = .22$, but not the inverted condition, $F(1, 50) = 0.85$, $p = .36$, $\eta_p^2 = .017$. As is common in LDTs, responses to human-related and machine words (i.e., actual words) were faster than responses to nonwords in both conditions, $ps < .001$.

Experiment 1 found that face inversion influences the activation of human-related words. Even brief exposures to upright faces (faces that are spontaneously processed in a configural manner) activated human-related words more so than did inverted faces. Further, given the failure of face orientation to influence response latencies to either machine words or nonwords, this is not easily explained by upright faces being processed more easily or inverted faces arresting attention, which would predict a main effect of face orientation. Finally, the fact that inverted faces elicit equivalent response latencies for both human-related and machine words is telling. This indicates that inverted faces, at least in terms of early concept activation, may fail to differentially activate human- and object-related concepts.

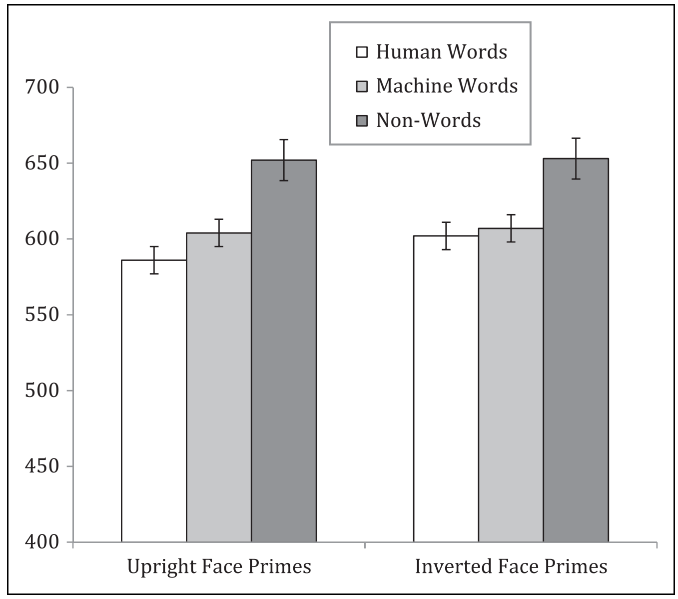

Figure 2. Lexical decision task response latency data from Experiment 1, and upright faces facilitate the activation of human-related concepts but not machine-related concepts. Error bars represent standard error of the mean.

Experiment 2

Experiment 1 supports the notion that processing human faces configurally activated human-related concepts, relative to faces that cannot be processed configurally. However, one reasonable counterargument to the findings of Experiment 1 is that perhaps inverting any stimulus will make it less representative of its category (e.g., inverting an apple makes it less applelike).

Experiment 2 was designed to conceptually replicate and extend the findings of Experiment 1, while ruling out this alternative explanation. In Experiment 2, we sought to extend this configural-to-humanity link to categorization, using a speeded face categorization task. If the activation of human-related concepts is stronger for upright relative to inverted human faces, then upright human faces should be more easily categorized as human than their inverted counterparts. However, we also predict that this inversion effect should have unique effects on stimuli that are processed configurally—human faces—and not on stimuli that are not typically processed in a strongly configural manner (e.g., animal faces).

To test this hypothesis, participants completed a speeded categorization task wherein they categorized human and chimpanzee faces, presented both upright and inverted, either "human" or "animal" as quickly and accurately as possible. We hypothesized that inverting human faces would slow categorization of these faces as human because it disrupts the signal of humanness generated by configural processing. The signal of "animalness," however, was not predicted to be generated by configural face processing, presumably the signal of chimpness is easily extracted from cues other than configurality. Supporting this, Dahl, Rasch, and Chen (2014) found that only own-species upright faces are afforded strong levels of configural processing, whereas inverted faces of all types (own- and other-species faces) are processed piecemeal. Thus, inverting nonhuman animals (including chimpanzee faces) should not interfere with the ability to categorize them as animals.

We predicted an interaction of species and orientation in categorization latencies. While face inversion was predicted to disrupt the categorization of human faces as humans, face inversion was not predicted to disrupt the categorization of chimpanzee faces as animals.

Participants

A *G**Power analysis using $\eta_p^2 = .065$ (Experiment 1's interaction effect size) and the same assumptions yields $N = 21$. Twenty-one White undergraduates completed a study with a 2 (face species: human, chimpanzee) × 2 (face orientation: upright, inverted) within-subjects design.

Procedure

Participants competed a speeded human versus animal categorization task for human and chimpanzee faces via computer. Face species and orientation were manipulated orthogonally across trials. Participants were presented with an equal number of upright and inverted human and chimpanzee faces. The animal faces were grayscale images of 20 neutral expression chimpanzees. The human faces were grayscale images of 20 neutral expression White males. Stimuli faced the camera, provided direct eye gaze, and were sized to approximately 200 × 300 pixels.

Participants first completed 8 practice trials and then completed 80 experimental trials (20 upright and 20 inverted for each face species). Faces were presented in a random order. Trials began with a fixation cross (1,000 ms), followed by either a human or a chimpanzee face, which remained onscreen until participants categorized the face via keystroke. Reaction times (RTs) were the primary dependent measure.

Results and Discussion

Of interest was whether inversion disrupted categorization of human but not animal faces. To test this, we first calculated mean categorization latencies separately for each of the four experimental conditions. Errors and RTs greater than 3 *SDs* from participants' mean were removed prior to analyses (<1% of all trials; the exclusion rule changed across studies due to the much faster RTs in Experiment 2).

Mean response latencies were submitted to a 2 (face species: human, animal) × 2 (face orientation: upright, inverted) repeated-measures ANOVA. This ANOVA revealed main effects of face species, $F(1, 20) = 8.17$, $p = .01$, $\eta_p^2 = .29$, and face orientation, $F(1, 20) = 6.72$, $p = .017$, $\eta_p^2 = .25$. As predicted, these main effects were qualified by a Species × Orientation interaction, $F(1, 20) = 6.21$, $p = .023$, $\eta_p^2 = .24$.

As shown in Figure 3, inversion slowed categorization of human faces as human ($M = 449$, 95% CI [371.59, 526.41], $SD = 181$) relative to upright human faces ($M = 383$, 95% CI [323.55, 442.45], $SD = 139$), $t(20) = 2.83$, $p = .01$, $d = .69$. However, for chimpanzee faces, orientation had no impact on categorization times, $t(20) = 1.04$, $p > .3$, $d = .09$. Comparing across face species, upright human and chimp faces were categorized with similar ease, $t(20) = 0.34$, $p = .74$, $d = .05$, whereas inversion slowed the categorization of human faces relative to chimp faces, $t(20) = 3.42$, $p = .003$, $d = .45$. Put simply, human faces seem uniquely sensitive to orientation in this species categorization task, with the categorization of human faces being impaired by inversion. However, for the chimp faces, categorization was not influenced by face orientation. Given the central role of face orientation in the configural processing of human faces (Valentine, 1988; Yin, 1969), these data provide consistent evidence that the configural processing of human faces influences decisions about others' humanity.

The design of Experiment 2 builds on the findings of Experiment 1 in important ways. First, the concept activation that was generated by configural face processing in Experiment 1 can have consequences for categorization. Although the relationship between categorization and activation was not tested, concept activation constrains categorization (Freeman & Ambady, 2011). Second, while Experiment 1 employed human versus machine comparisons, Experiment 2 employed human versus animal comparisons. Our model is agnostic as to whether configurality triggers "uniquely human" or "human nature" characteristics (Haslam, 2006, 2014). However, given that well-established models rely on this distinction, it is noteworthy that the current work demonstrates that configurality triggers humanness relative to both machines and animals.

Importantly, given that these data demonstrate unique effects for human faces but not animal faces, they are not easily explained away by arguing that changing the canonical orientation of stimuli in general reduces category accessibility. Were this true, both human and chimpanzee faces should demonstrate sensitivity to the inversion effect. Given the interaction demonstrating effects uniquely for the human face, this is clearly not the case here. This argument is further bolstered by the demonstration that upright chimp faces are not more difficult to categorize than human faces at baseline. This indicates that this task is equivalently difficult for the familiar upright orientation. Instead, the findings of Experiment 2 clearly

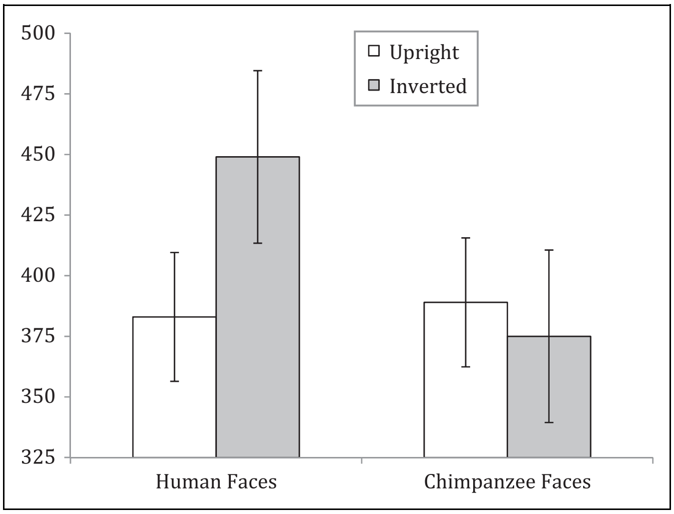

Figure 3. Categorization latency data from Experiment 2, and face inversion inhibits the categorization of human faces but not chimpanzee faces. Error bars represent standard error of the mean.

indicate that configural processing is an effect specific to human faces: Disrupting configural processing of human faces disrupts the categorization of humans, an identical manipulation on structurally similar animal faces has no such effect on categorization of animals.

Experiment 3

Experiments 1 and 2 yield direct evidence that face orientation—a potent manipulation of configural face processing—influences both concept activation and categorization of humanness. Experiment 3 was designed to extend these effects to a consequence of this spontaneous activation: the deliberate ascription of humanlike characteristics. Specifically, participants rated upright and inverted human faces on a number of traits indicative of humanness, taken from the mind perception and dehumanization literatures. We hypothesized that inverted faces would be rated as lower on these dimensions indicative of humanness, relative to upright faces.

Method

Participants and Design

A *G**Power analysis with the same assumptions as above yields $N = 24$ to achieve 95% power to detect moderate-sized effects. Twenty-nine White undergraduates (17 women) participated for partial course credit. Face orientation (upright vs. inverted) was manipulated within subjects. The dependent measure was average ratings on five traits indicative of humanness.

Procedure

Participants were instructed that people often show accuracy in personalities ratings of others at zero acquaintance. All participants then viewed 40 White male faces (20 upright and 20 inverted; see Experiment 2). Orientation was counterbalanced across face identity such that each face was equally likely to be seen upright or inverted.

Participants indicated how thoughtful, empathetic, considerate, creative, and humanlike each face appeared on scales from 1 = *not at all* to 7 = *very much*. These five traits were selected from a larger pool of traits that we extracted from relevant literature on dehumanization (Haslam, 2006) and mind perception (Gray, Gray, & Wegner, 2007) and have been used in other research investigating ascriptions of humanity (See & Hugenberg, 2015). Each face was displayed at the center of the screen for 500 ms, which was then occluded by a gray box for 250 ms, after which a trait appeared onscreen, along with the rating scale. Participants rendered ratings via keystroke.

Results and Discussion

Of interest was whether face inversion influenced trait ratings indicative of humanness. To test this, ratings were averaged into separate upright and inverted means (Cronbach's αs > .71), separately for each participant. Consistent with predictions, a paired samples *t*-test indicated that participants ascribed significantly lower levels of humanlike traits to the inverted faces ($M = 3.79$, 95% CI [3.56, 4.02], $SD = 0.62$) than to the upright faces ($M = 4.05$, 95% CI [3.84, 4.26], $SD = 0.58$), $t(28) = 3.83$, $p < .001$, $d = .43$.

This experiment provides evidence that even explicit ratings of the humanness of faces were influenced by configural face processing. Notably, the high reliability indicated that our dimensions of humanness measure a unified construct; however, an analysis of even our most face valid dimension of humanity—humanlike—yielded identical results: Upright faces ($M = 5.34$, 95% CI [4.86, 5.82], $SD = 1.25$) were rated as more "humanlike" than were inverted faces ($M = 5.05$, 95% CI [4.55, 5.55], $SD = 1.31$), $t(28) = 2.30$, $p = .029$, $d = .23$. Further, the fact that face inversion influenced explicit ratings may seem somewhat surprising given that an inverted face is still logically human. And yet, the data clearly indicate that even trait ratings, which can be susceptible to attempts at correction (Wegener & Petty, 1995), were influenced by face inversion. Finally, given that the current stimuli are evaluatively positive, we collected additional data with a separate sample of participants ($N = 36$) who rated the faces on "attractiveness" to ensure the effects were not due to inversion affecting all positive dimensions. Upright faces ($M = 4.11$, 95% CI [3.74, 4.48], $SD = 1.09$) and inverted faces ($M = 4.04$, 95% CI [3.69, 4.39], $SD = 1.04$) were rated as equivalently attractive, $t(35) = 0.64$, $p > .5$, $d = .065$, which is not consistent with a valence explanation.

General Discussion

Across three studies, we provided novel evidence that the activation of human-related concepts, the categorization of faces as human, and the ascription of humanity were sensitive to face inversion, which reliably disrupts the spontaneous configural processing typical of upright faces.

Whereas past research has focused on motivated processes in deciding individuals and groups are fully human, the goal of the current work was to demonstrate that the ascription of humanness can have roots in purely *perceptual* processes. Indeed, the premise that perceived humanness can be the product of bottom-up perceptual processes has received relatively short shrift in the expanding literatures on ascriptions of humanness and mind perception (see Epley et al., 2007; Looser & Wheatley, 2010). Put simply, dehumanization can occur above and beyond a stigmatized identity and for reasons other than perceivers' motivation to dehumanize others.

This work has connections to multiple literatures, including work on autism, facial stigma, and face perception. First, autism is associated with both impairments in theory of mind (Baron-Cohen, 1995) and abnormal face processing, including failures to configurally process faces (Behrmann et al., 2006). The impairments linked to autism share features of (mechanistic) dehumanization (Haslam, 2006), suggesting that theory of mind deficits central to autism may be related to face processing. From our perspective, it may not be happenstance that those with chronic inabilities to process the complex mental states of others also have chronic inabilities to process faces in a manner distinct from objects.

The current research can also inform literature on facial stigma. Goffman's (1963) seminal work on stigma included so-called ''abominations of the body'' as primary type of stigma, which can cause others to be "discredited" and treated as less-than-human. Goffman's original work placed special focus on facial stigma (facial scarring and harelips). Given that facial stigma often violate the typical configuration of features, the stigmatizing nature of facial scarring may actually generate from a violation of otherwise ''normal'' face perception processes (see also Young, Sacco, & Hugenberg, 2011). Thus, the stigmatizing nature of facial scarring may be an emergent property of both bottom-up processes (configural violations) and top-down processes (stereotypes).

Further, given that the current research has employed the most commonly used manipulation of configural processing in the face perception literature, this does broach the provocative question about whether some configural face effects observed in the literature might be mediated by perceptions of humanness. For example, in-groups are configurally processed more than out-groups (Hugenberg & Corneille, 2009; Michel et al., 2006). Given the findings that devalued social groups are not processed as fully human (Harris & Fiske, 2006), this raises the possibility that this difference may be due, in part, to differential perception of the groups as human.

Finally, the current work leaves open the question of why configural face processing cues humanness. We see multiple possibilities. First, it is possible that the configural–humanity link is innate. Indeed, newborn infants attend to facelike configurations more so than inverted facelike configurations (Turati, Simion, Milani, & Umiltá, 2002), and this could occur in part because of an innate link between configurality and animacy. Perhaps more likely is that people come to associate configural processing with humanness. Indeed, if one typically reserves configural processing for human faces, the configural–human association is likely quickly learned and heavily reinforced. If so, this raises a provocative question: If perceivers can be trained to configurally process nonhuman stimuli, will perceivers anthropomorphize those stimuli? Past work has demonstrated that, with sufficient perceptual expertise, perceivers can learn to process nonhuman stimuli configurally—bird experts show facelike processing of birds (e.g., a facelike neural response; see Gauthier et al., 2000). So do birders therefore anthropomorphize birds more than do nonexperts? Perhaps. However, electroencephalographic research suggests that real human faces and humanlike doll faces are not distinguished until after the encoding stage when configural processing is thought to occur (Wheatley et al., 2011). Whether configural processing is sufficient to generate a signal of humanness without humanlike perceptual content, or whether this is an interaction between configural processing and human-specific facial content is an open question.

Conclusion

The current work provides clear, novel evidence that configural face processing—a feature-integration process that distinguishes face from object perception—influences the activation, categorization, and ascription of humanness. Configural face processing is a perceptual gateway for perceptions of humanness and dehumanization: Perceiving faces as human depends on configural processing.

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Notes

1. Following Maurer, Le Grand, and Mondloch (2002), we define holistic processing as a subset of configural processing.
2. Given the White participant population, we used same-race (White) faces because race affects face perception (Hugenberg & Wilson, 2013).

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