

INVERSION REDUCES SENSITIVITY TO COMPLEX EMOTIONS IN EYE REGIONS

Brittany S. Cassidy, Robert W. Wiley
University of North Carolina at Greensboro

Mattea Sim, Kurt Hugenberg
Indiana University, Bloomington

Inferring humans' complex emotions is challenging but can be done with surprisingly limited emotion signals, including merely the eyes alone. Here, we test for a role of lower-level perceptual processes involved in such sensitivity using the well-validated Reading the Mind in the Eyes task. Over three experiments, we manipulated configural processing to show that it contributes to sensitivity to complex emotion from human eye regions. Specifically, inversion, a well-established manipulation affecting configural processing, undermined sensitivity to complex emotions in eye regions (Experiments 1–3). Inversion extended to undermine sensitivity to nonmentalistic information from human eye regions (gender; Experiment 2) but did not extend to affect sensitivity to attributes of nonhuman animals (Experiment 3). Taken together, the current findings provide evidence for the novel hypothesis that configural processing facilitates sensitivity to complex emotions conveyed by the eyes via the broader extraction of socially relevant information.

Keywords: face perception, eyes, complex emotions, sensitivity, configural processing

Information from eye regions helps people understand others' complex inner emotions (Baron-Cohen et al., 1997). Compared to basic emotions (e.g., angry), complex emotions (e.g., suspicious) are theorized to be more internally caused (Demoulin et al., 2004) and uniquely human (Leyens et al., 2000). Because complex emotion sensitivity is critical to navigate social interactions (Kunstman & Maner,

Supplemental material is available online.

The authors declare no conflicts of interest.

This work was supported by NSF grant BCS-1748761.

Address correspondence to: Brittany S. Cassidy, Department of Psychology, University of North Carolina at Greensboro, 296 Eberhart, PO Box 26180, Greensboro, NC 27412. E-mail: bscassid@uncg.edu.

© 2022 Guilford Publications, Inc.

2011) and because many people with social dysfunction show impaired sensitivity (e.g., Sato et al., 2017), much work has sought to identify mechanisms for decoding complex emotions from eye regions. However, most work focuses on top-down factors (Adams et al., 2009), with bottom-up visual differences mainly being examined between basic emotions (Smith et al., 2005). The perceptual operations affecting complex emotion sensitivity are understudied. This gap in the literature is striking given work showing perceptual operations to affect core aspects of social perception (Fincher et al., 2017).

We combined these perspectives to examine whether *configural processing*—a perceptual process characteristic of face processing—affects sensitivity to complex emotions from eye regions. Although implicated in basic emotion perception (Krumhuber et al., 2019), the contributions of configural processing to complex emotion decoding are understudied. We focus on eye regions for three reasons. First, eyes are central to making sociocognitive inferences (Looser & Wheatley, 2010). Second, common measures of complex emotion decoding focus on eye regions (Baron-Cohen, 1994). Third, eye region configuration enables sensitivity to nonverbal displays (Jenkins & Langton, 2003).

People's ease in differentiating between upright faces is theorized to derive from configural processing. The mechanism by which configural processing arises is debated. Some argue that it is a product of perceptual training with faces (e.g., Curby & Gauthier, 2010), whereas others argue that it is a product of biological preparation for face-specific stimuli (e.g., Riddoch et al., 2008). What is clear, however, is that faces are processed in a different way from most other stimuli (see Piepers & Robbins, 2012). Configural processing (see Maurer et al., 2002) is often described as integrating cues into a perceptual gestalt (Young et al., 2013). Here, we used inversion (Yin, 1969) to test if configural processing affects complex emotion decoding from eye regions. Inversion is the "gold standard" manipulation of configural processing (e.g., Young et al., 2013), maintaining features but disrupting their typical configuration. Notably, inversion even elicits inefficient processing of partial faces. Inverting eye regions, for example, undermines perceiving and remembering them (Civile et al., 2014; Rakover & Teucher, 1997) and impairs gaze sensitivity (Jenkins & Langton, 2003; Senju & Hasegawa, 2006; Vecera & Johnson, 1995). Configural cues within eye regions (e.g., the iris position in relation to the eye corner) may thus convey social meaning.

Perceptual processes may indeed affect complex emotion decoding from the eyes. Seeing eyes enables emotion decoding (Ganel et al., 2005) and thinking about complex emotions (Calder et al., 2002). It also facilitates mind ascription (Khalid et al., 2016; Schein & Gray, 2015). Decoding complex emotions from eyes also elicits brain activation reflecting face processing (Adams et al., 2009). Extending this work by examining a specific process, we hypothesized that configural processing contributes to this sensitivity. Indeed, extracting social cues from faces is theorized to rely, in part, on configural processing (Wilson et al., 2018).

People better identify basic emotions on upright versus inverted faces (e.g., Bombardi et al., 2013; Calder et al., 2000; McKelvie, 1995; White, 1999; Young & Hugenberg, 2010). We reasoned that configural contributions to basic emotion perception

would extend to complex emotion decoding because perceptual operations may be especially important to distinguishing among fine face details differentiating complex emotions. Indeed, complex (versus basic) emotions are often less visible or intense displays (Shaver et al., 1992). Further, ingroup identification advantages for basic emotions emerge in part because these faces more likely receive configural processing (Young & Hugenberg, 2010). Because ingroup advantages emerge for complex emotion sensitivity (Adams et al., 2009), configural processing may affect decoding them, too. Finally, configural processing seems important to infer humanlike attributes (Cassidy et al., 2017; Wilson et al., 2018). Specifically, inversion undermines expressive faces from appearing mentally sophisticated (Krumhuber et al., 2019). Disrupting configural processing may reduce sensitivity to complex emotions because they are seen as uniquely human (Leyens et al., 2000).

We tested whether configural processing affects decoding complex emotions from eyes using the Reading the Mind in the Eyes task (RME; Baron-Cohen et al., 2001). Each trial featured an eye region displaying a complex emotion and four attributes. People selected the attribute reflecting what each person is feeling. Although several cognitive contributions to sensitivity in the RME have been identified (e.g., Stevenson et al., 2012), the current work is among the first to manipulate *perceptual* processes to identify contributions. We had two goals. The first was to test whether manipulating configural processing (via inversion) affects complex emotion decoding from eyes (Experiments 1–3). The second was to test whether this effect was emotion-specific or if inversion broadly undermined sensitivity. In Experiment 2, we examined inversion effects on complex emotion and gender sensitivity in the same eye regions. Because configural processing is largely specific to human-relevant stimuli (Maurer et al., 2002) and traits (Wilson et al., 2018), we tested if inversion undermined sensitivity to inferences about human eye regions, but not nonhuman animals, in Experiment 3.

EXPERIMENT 1

Experiment 1 tested whether inversion reduces complex emotion decoding from eye regions. Participants completed an RME (Baron-Cohen et al., 2001) task including upright and inverted eye regions within-participants. We hypothesized better decoding from upright versus inverted eye regions.

METHOD

Participants. We recruited 40 MTurk participants ($M_{\text{age}} = 37.85$ years, $SD = 10.80$; 19 female), which provided 91.1% power to detect an effect size of $d = 0.65$ for an inversion effect when specifying a crossed design and setting participants and items as random factors (www.jakewestfall.org/pangea). All experiments were approved by the Institutional Review Board at the University of North Carolina at Greensboro. Notably, concerns about online samples can be mitigated by data screening (Chimielewski & Kucker, 2020) to ensure comparable data quality (Walter et al., 2019). A sensitivity analysis for the inversion effect indicated a minimum

detectable effect of log-odds ratio = -0.22 with power = 0.80 and $\alpha = 0.05$. This effect translates to an odds-ratio of 1.55 (a canonically small effect; Chen et al., 2010) indicating accurate decoding 1.55 times more likely for upright than inverted eye regions.

Materials and Procedure. Participants completed an RME (Baron-Cohen et al., 2001) task consisting of 36 self-paced and randomly presented grayscale images of eye regions. On each trial (Figure 1a), participants viewed an eye region and four attributes (one target and three foils labeled 1 through 4) with comparable emotional qualities (for details, see Baron-Cohen et al., 2001; stimuli available at <https://www.autismresearchcentre.com/tests/eyes-test-adult/>). Participants selected the attribute best describing the depicted emotion by pressing the associated number on their keyboard. Key presses advanced trials. Orientation was counterbalanced such that eye regions were equally likely seen upright or inverted. Breaks were not offered given the short study duration (under 10 minutes). Participants were instructed to read all words and to respond as quickly as possible. There were no display requirements. Treating participants as a random effect accounts for potential display effects on decoding.

Although most RME work examines decoding across items, some work acknowledges emotion valence can affect performance (e.g., Franklin & Zebrowitz, 2016). We had no a priori hypotheses regarding valence because inversion affects sensitivity to several basic emotions (Bombardieri et al., 2013). However, we counterbalanced valence across orientation using norms categorizing items as positive, neutral, or negative (Harkness et al., 2005). There were four positive, eight neutral, and six negative items in each orientation. Participants also indicated instruction adherence ("Did you follow the instructions to the best of your ability?" rated from 1 [not at all] to 7 [completely]; $M = 6.90$, $SD = 0.30$).

RESULTS

We examined mixed-effects models logistically regressing Decoding (decoded = 1, not decoded = 0) on Inversion (upright = -1 , inverted = 1). The random-effects structure specified intercepts varying by participant and item and inversion effects varying by participant and item. This structure ruled against specific participants or items driving results. An exploratory model reported in the Supplemental Materials also specified Valence effects (negative, neutral, and positive) and the interactions with Valence. Models were built using the lme4 package (Bates et al., 2015) in R. CIs of 95% referring to effect size were estimated using the *confint* function. *P*-values were calculated using the lmerTest package (Kuznetsova et al., 2017). Estimated marginal means were obtained using the emmeans package (Lenth, 2018). Sensitivity analyses (simr package; Green & MacLeod, 2016) determined the minimum effect size for the focal effect in each experiment maintaining power at 0.80 as assessed by a simulation with 1,000 iterations per model (all data and code available at: <https://osf.io/xmz2j/>).

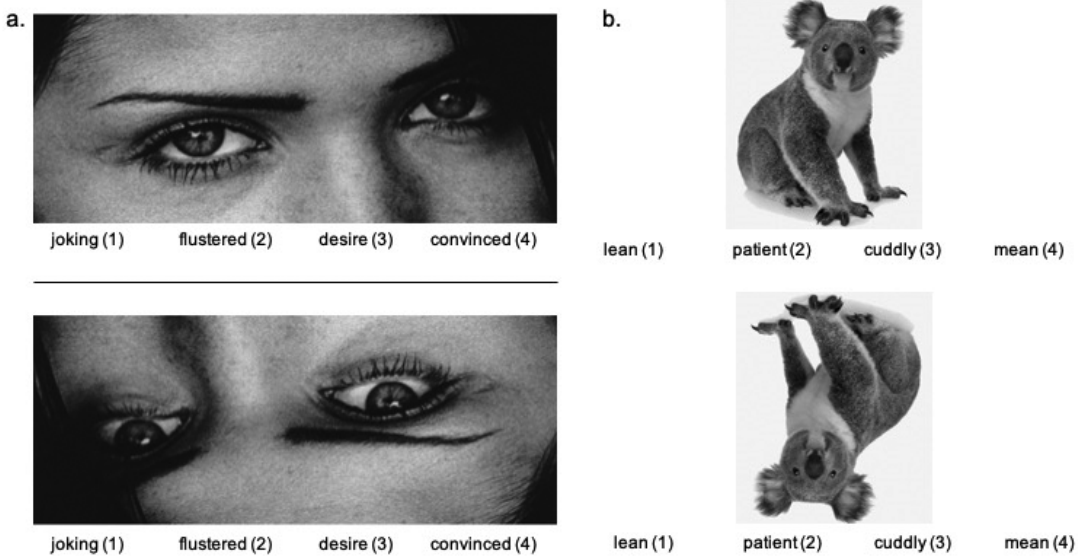


FIGURE 1. Examples of upright and inverted eyes trials in Experiments 1–3 (a) and animal trials in Experiment 3 (b). Two attributes [gender categories] were seen below each eye region in Experiment 2.

The random-effects structure showed variability across participants ($SD = 0.85$, 95% CI [0.59, 1.08]) and items ($SD = 0.55$, 95% CI [0.31, 0.71]). Inversion effects varied across participants ($SD = 0.28$, 95% CI [0.06, 0.43]) and items ($SD = 0.15$, 95% CI [0.01, 0.29]). An Inversion effect (Figure 2a) showed better decoding from upright ($Estimate = 0.70$, 95% CI [0.60, 0.78]) versus inverted ($Estimate = 0.57$, 95% CI [0.49, 0.64]) eye regions, $b = -0.29$, $SE = 0.08$, $z = 3.61$, $p = .003$, 95% CI [-0.46, -0.15], corresponding to OR = 1.79. See Supplemental Material for response frequencies per item for each experiment. The exploratory model did not improve model fit, $\chi^2(4) = 3.47$, $p = .48$ (see the Supplemental Material).

DISCUSSION

Decoding was better from upright versus inverted eye regions. This finding parallels work showing that configurally processing eye regions elicits better gaze sensitivity (Jenkins & Langton, 2003; Senju & Hasegawa, 2006). It also forges a link between work showing the role of configural processing in humanization (Hugenberg et al., 2016) and between humanization and complex emotions (Leyens et al., 2000). Configural processing seems involved in sensitivity to complex emotions. The lower bounds of confidence intervals for decoding complex emotions were above chance (upright: 0.60; inverted: 0.49; chance: 0.25). Undermining configural processing thus does not *sever* sensitivity. Rather, it is more likely

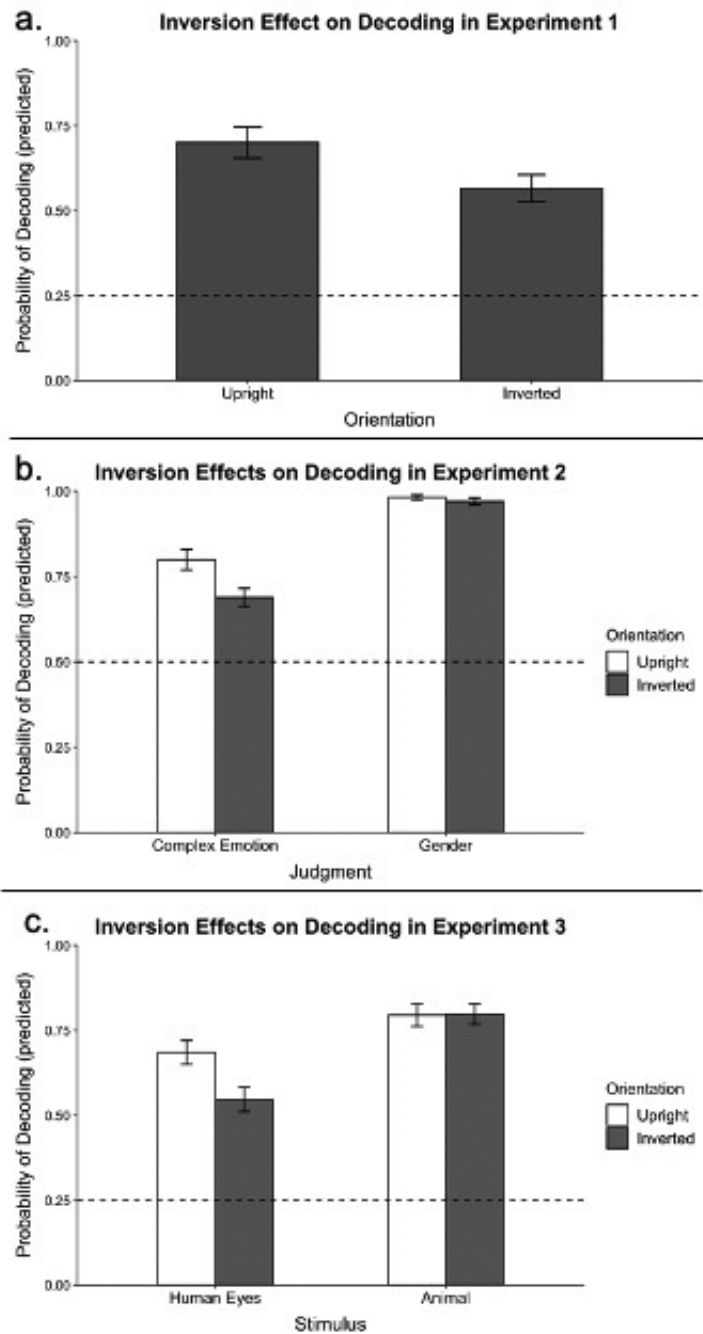


FIGURE 2. An inversion effect emerged when decoding complex emotions from human eye regions in Experiment 1 (a). This effect extended to decoding gender from human eye regions in Experiment 2 (b). Inversion effects emerged when decoding complex emotions of human eyes, but not when decoding attributes of animals, in Experiment 3 (b). Dashed lines reflect chance-level performance.

among multiple contributors to decoding complex emotions (e.g., identity; Stevenson et al., 2012).

EXPERIMENT 2

We next examined if an inversion effect was emotion-specific or if it reflected broader sensitivity to cues from eye regions. We modified Experiment 1 so people decoded gender and complex emotions from upright and inverted eye regions. All variables were manipulated within-participants. Gender trials are often used as RME control trials (e.g., Adams et al., 2009). Albeit matched in visual input, gender judgments require nonmentalistic engagement with stimuli.

One possibility was that inversion undermines sensitivity to complex emotions, but not gender, in eye regions. This pattern would reflect a specific effect undermining mentalistic cue sensitivity. Supporting this possibility, inversion often impairs extracting identity, but not gender, from faces (Cloutier et al., 2005). Alternatively, inversion may broadly undermine sensitivity because it undermines categorizing people (Hugenberg et al., 2016). Inversion also impairs extracting gender from faces lacking highly diagnostic gender cues (e.g., hairstyle; Cloutier & Macrae, 2007). Although eye regions convey gender cues, they lack hairstyle features diagnostic of gender even when faces are not present (Macrae & Martin, 2007). Without such features, inversion may broadly undermine sensitivity. Experiment 2 allowed us to understand whether inversion effects from Experiment 1 reflect emotion-specific disruptions or general deficits emergent when disrupting configural processing.

METHOD

Participants. We targeted 60 participants, providing 81.5% power to detect an effect size of $d = 0.50$ for an Inversion $\times$ Judgment interaction using a crossed design and setting participants and items as random factors. Because preliminary analyses suggested this sample was potentially underpowered to detect an interaction, we recruited 30 more participants. Accounting for this addition, we set a more conservative alpha (.01). One participant was excluded for entering an incorrect survey code. The analyzed sample included 89 MTurk participants ($M_{\text{age}} = 35.90$ years, $SD = 13.99$; 36 female). Participants adhered to task instructions ($M = 6.85$, $SD = 0.39$). The minimum detectable Inversion effect was log odds-ratio = -0.23 with power = 0.80 and alpha = .01, corresponding to OR = 1.58.

Modified RME. The RME comprises 18 male and 18 female eye regions. We modified it to comprise 18 emotion and 18 gender trials. Each trial comprised an eye region and two attributes. On emotion trials, participants selected which of two attributes best reflected the depicted emotion. One was the target from Experiment 1. The other was the most selected foil in Experiment 1. On average, 19.44% ($SD = 7.25\%$) of Experiment 1 participants chose the foil used in Experiment 2. In gender trials, the words were “male” and “female.”

Four versions counterbalanced eye regions across judgment (emotion and gender) and orientation (upright and inverted). Within the 18 trials of each judgment, nine eye regions were upright and nine inverted. In each version, participants made nine emotion judgments about female faces, nine emotion judgments about male faces, nine gender judgments about female faces, and nine gender judgments about male faces. Because there were nine trials in each of the four conditions counterbalancing judgment and orientation, eye region gender could not be evenly split within orientation. Eye region gender was counterbalanced across versions (e.g., whereas some participants would see more upright male eye regions in the emotion condition, others would see more upright female eye regions in the emotion condition).

RESULTS

We examined a mixed-effects model logistically regressing Decoding (not decoded = 0, decoded = 1) on Inversion (upright = -1, inverted = 1), Judgment (gender = -1, emotion = 1), and their interaction. Extending Experiment 1, we specified random slopes of Judgment by participant and item. There was variability across participants ($SD = 0.56$, 95% CI [0.37, 0.76]) and items ($SD = 0.91$, 95% CI [0.60, 1.23]). Inversion effects varied across participants ($SD = 0.09$, 95% CI [0.01, 0.30]) and items ($SD = 0.19$, 95% CI [0.07, 0.34]). Judgment effects varied across participants ($SD = 0.15$, 95% CI [0.01, 0.43]) and items ($SD = 0.66$, 95% CI [0.39, 0.92]).

An Inversion effect showed better decoding from upright ($Estimate = 0.94$, 95% CI [0.90, 0.96]) versus inverted ($Estimate = 0.89$, 95% CI [0.85, 0.93]) eye regions, $b = -.27$, $SE = 0.09$, $z = 3.05$, $p = .002$, 95% CI [-0.48, -0.10]. A Judgment effect showed better gender ($Estimate = 0.98$, 95% CI [0.96, 0.99]) versus complex emotion ($Estimate = 0.75$, 95% CI [0.69, 0.80]) decoding, $b = -1.32$, $SE = 0.16$, $z = 8.18$, $p < .001$, 95% CI [-1.72, -1.04]. No interaction emerged, $b = -0.02$, $SE = 0.08$, $z = 0.30$, $p = .77$, 95% CI [-0.15, 0.15] (Figure 2b). Instead, the inversion effect emerged significantly for complex emotion decoding, $OR = 1.80$, $SE = 0.27$, $z = 3.98$, $p < .001$, 95% CI [1.35, 2.40], and marginally for gender decoding, $OR = 1.64$, $SE = 0.49$, $z = 1.68$, $p = .09$, 95% CI [0.92, 2.93]. Although the inversion effect for gender decoding only approached significance whereas the inversion effect for complex emotion decoding was significant, these effects should be considered equivalent. Indeed, complementing numerically very similar Inversion effects across judgments ($OR = 1.80$ vs. 1.64), Bayesian information criterion (BIC) measures indicated “strong” evidence (Kass & Raftery, 1995) that a model without the interaction term is 54 times more probable than a model with it (BIC = 2,540 versus 2,548).

DISCUSSION

Judgment did not qualify the inversion effect. Indeed, inversion reduced the accuracy of both complex emotion and gender decoding by a similar magnitude ($OR = 1.80$ and 1.64, respectively), with no evidence in favor of an interaction.

An overall inversion effect reflects work showing inversion to undermine gender sensitivity when hairstyle features highly diagnostic of gender are absent (Macrae & Martin, 2007). Indeed, brain activation reflecting face and configural processing emerges when extracting gender from faces (Cloutier et al., 2008) and when considering emotions (Kesler et al., 2001). Disrupting configural processing may thus undermine complex emotion perception from eye regions via a general perceptual disruption, rather than an emotion-specific effect.

Because judgment did not qualify the inversion effect, an open question was whether inversion undermines sensitivity overall or if it especially undermines judgments from human faces. To this end, we next examined inversion effects using different control trials.

EXPERIMENT 3

Next, we included “animal attribute” trials previously used as controls in the RME (e.g., Harkness et al., 2012; Harkness et al., 2005) that comprise an animal image and four attributes. People select the attribute best describing the animal image, mirroring RME trials but using nonhuman stimuli. These trials are conceptually closer to complex emotion decoding than gender decoding because both involve emotional inferences while mirroring surface characteristics.

Animal trials are a valuable control because, for most people, inversion has little effect on perceiving animals (e.g., Dahl et al., 2014; Hugenberg et al., 2016; but see Young, Goldberg, et al., 2019). Further, people appear to engage in configural processing more when evaluations are human-relevant (Wilson et al., 2018). Because matching nonhuman animals to attributes is not human-relevant, an upright configuration should not facilitate performance. We hypothesized a stronger inversion effect for complex emotion than animal attribute decoding.

METHOD

Participants. We again recruited 90 participants. Excluding one participant for entering an incorrect survey code, the analyzed sample comprised 89 MTurk participants ($M_{\text{age}} = 35.37$ years, $SD = 10.94$; 36 female). Participants adhered to instructions ($M = 6.70$, $SD = 0.70$). A sensitivity analysis for the interaction indicated that a minimum detectable effect size of log-odds ratio = -0.11 with power = 0.80 and $\alpha = 0.05$.

Modified RME. We modified the RME to include 36 animal trials. On animal trials, participants saw a black-and-white animal image and four attributes beneath it (e.g., Figure 1b). Participants selected the attribute best describing the animal image. Four versions counterbalanced eye region and animal orientation within-participants.

Twelve animal trials were from past work (Harkness et al., 2005). Twenty-four were created to match the number of eyes trials. For each new trial, experimenters selected an animal image, a target attribute reflecting the image, and three foils

not reflecting the image. Stimuli were validated by 21 undergraduates ($M_{\text{age}} = 19.81$ years, $SD = 3.23$) who selected the attribute best describing each image (see Supplemental Material; images available upon request). However, 73.15% ($SD = 12.32\%$) of participants selected the target, suggesting performance was not at ceiling. There was no difference in the percentage of participants selecting the target in previously published ($M = 0.78$, $SD = 0.12$) and newly created stimuli ($M = 0.71$, $SD = 0.12$) trials, $t(34) = 1.63$, $p = .11$. Previously published and newly created trials were evenly distributed among upright and inverted animal trials. There was no difference in the percentage of participants selecting the target on trials designated as upright ($M = 0.71$, $SD = 0.11$) versus inverted ($M = 0.75$, $SD = 0.13$), $t(34) = 0.37$, $p = .41$.

RESULTS

We examined a mixed-effects model logistically regressing Decoding (not decoded = 0, decoded = 1) on Inversion (upright = -1, inverted = 1), Stimulus (animal = -1, human eyes = 1), and their interaction. We modified the random effects from Experiment 1 to specify a random slope of Stimulus by participant. There was variability across participants ($SD = 1.03$, 95% CI [0.84, 1.20]) and items ($SD = 0.62$, 95% CI [0.48, 0.72]). Inversion effects varied across participants ($SD = 0.18$, 95% CI [0.06, 0.26]) and items ($SD = 0.21$, 95% CI [0.06, 0.27]). A Stimulus effect varied across participants ($SD = 0.39$, 95% CI [0.27, 0.47]).

Inversion, $b = -0.14$, $SE = 0.04$, $z = 3.19$, $p = 0.001$, 95% CI [-0.24, -0.06], and Stimulus, $b = -0.44$, $SE = 0.04$, $z = 4.89$, $p < .001$, 95% CI [-0.61, -0.26], effects emerged. The interaction emerged (Figure 2c), $b = -0.15$, $SE = 0.04$, $z = 3.82$, $p < .001$, 95% CI [-0.23, -0.08]. Simple effects showed better decoding from upright (*Estimate* = 0.69, 95% CI [0.61, 0.75]) versus inverted (*Estimate* = 0.55, 95% CI [0.48, 0.62]) human eyes, $OR = 1.80$, $SE = 0.20$, $z = 5.28$, $p < .001$, 95% CI [1.45, 2.24]. Attributes were similarly decoded from upright (*Estimate* = 0.80, 95% CI [0.72, 0.85]) and inverted (*Estimate* = 0.80, 95% CI [0.73, 0.85]) animals, $OR = 0.98$, $SE = 0.13$, $z = 0.17$, $p = .87$, 95% CI [0.76, 1.26].

DISCUSSION

Inversion affected inferences from human eyes. Animal attribute decoding was better than complex emotion decoding (but not at ceiling), yet unaffected by inversion. Thus, although inversion affected distinct inferences from humans (Experiment 2), it did not affect inferences from nonhumans. This pattern parallels work showing that configural processing is more common to perceiving humans than animals (Dahl et al., 2014).

One possibility is that animal trials reflected semantic retrieval unaffected by configural processing. However, animal attributes were selected based on images. Further, although animals have stereotypic attributes, visual cues enable sensitivity to displayed attributes (e.g., a cat can appear playful or threatened). Because people belong to groups with stereotypic attributes (Cassidy et al., 2017), future work may examine the interplay between semantic retrieval and attribute decoding

on understanding people. Critically, the emergent pattern parallels work showing inversion to affect making inferences about human-relevant, but not animal-relevant, traits (Wilson et al., 2018) and about human, but not animal, faces (Hugenberg et al., 2016). Although we cannot deny contributions of semantic knowledge to attribute selection, this pattern nevertheless suggests a boundary for configural contributions to decoding. Inversion may undermine sensitivity to human-specific cues versus any inference.

GENERAL DISCUSSION

This work identified perceptual contributions to complex emotion decoding from eye regions. Using inversion to manipulate configural processing (Yin, 1969), better complex emotion decoding emerged from upright versus inverted eye regions (Experiments 1–3). This pattern extended to other inferences about human eye regions (Experiment 2) but not nonhuman animals (Experiment 3). Thus, this pattern likely reflects perceptual operations affecting inferences about human faces.

This work reflects several theoretical advances. Paralleling basic emotion research (e.g., Bombari et al., 2013), inversion reduced complex emotion sensitivity. Although basic and complex emotions differ in what they convey (Demoulin et al., 2004) and their appearance (Shaver et al., 1992), this work suggests a shared perceptual foundation in how they are “read.” This work also complements research showing configural information within eye regions as essential to social communication (Vecera & Johnson, 1995). Just as it enables gaze sensitivity (Jenkins & Langton, 2003), critical to navigating social interactions (Adams & Kleck, 2003), configural information also appears essential to discriminate between subtle differences among complex emotions also guiding interactions (Baron-Cohen et al., 1997). This latter point may be important for future work by reflecting a need to examine mechanisms for how eye regions specifically affect social perception and its consequences when compared to full faces (Looser & Wheatley, 2010).

These findings also have implications spanning domains. For example, they have implications for interpersonal sensitivity, a domain where research on bottom-up contributions to emotion perception often focuses on affective displays themselves (e.g., Smith et al., 2005). These findings also link to work showing inversion effects on evaluations characteristic of humanization (Hugenberg et al., 2016). To the extent that humanizing faces relies on upright configurations (Young, Tracy, et al., 2019), upright configurations may affect sensitivity to complex emotions characteristic of humanness (Leyens et al., 2000).

Future work would benefit from examining these effects from an intergroup lens. People show better complex emotion decoding for ingroup versus outgroup members (Adams et al., 2009). Ingroup versus outgroup faces are also more likely to receive face-typical processing (Hugenberg & Corneille, 2009), and ingroup faces elicit more attention to the eyes (Cassidy et al., 2019). Future work may test whether people are more sensitive to complex emotions from ingroup versus outgroup eyes because their eyes are more efficiently processed.

Configural processing contributes to emotion perception (e.g., Young & Hugenberg, 2010). The current work shows that configural processing also contributes to decoding complex emotions in eye regions. This effect appears to occur because disrupting configural processing undermines extracting socially relevant information.

REFERENCES

- Adams, R., & Kleck, R. (2003). Perceived gaze direction and the processing of facial displays of emotion. *Psychological Science*, 14, 644–647.
- Adams, R., Rule, N., Franklin, R., Jr., Wang, E., Stevenson, M., Yoshikawa, S., Nomura, M., Sato, W., Kestutis, K., & Ambady, N. (2009). Cross-cultural reading the mind in the eyes: An fMRI investigation. *Journal of Cognitive Neuroscience*, 22(1), 97–108.
- Baron-Cohen, S. (1994). How to build a baby that can read minds: Cognitive mechanisms in mindreading. *Cahiers de Psychologie Cognitive*, 13, 513–552.
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The “Reading the Mind in the Eyes” test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Psychology and Psychiatry*, 42, 241–251.
- Baron-Cohen, S., Wheelwright, S., & Jolliffe, T. (1997). Is there a “language of the eyes?” Evidence from normal adults, and adults with autism or Asperger syndrome. *Visual Cognition*, 4, 311–331.
- Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1–48.
- Bombardi, D., Schmid, P., Mast, M., Birri, S., Mast, F., & Lobmaier, J. (2013). Emotion recognition: The role of featural and configural face information. *Quarterly Journal of Experimental Psychology*, 66(12), 2426–2442.
- Calder, A., Lawrence, A., Keane, J., Scott, S., Owen, A., Christoffels, I., & Young, A. (2002). Reading the mind from eye gaze. *Neuropsychologia*, 40(8), 1129–1138.
- Calder, A., Young, A., Keane, J., & Dean, M. (2000). Configural information in facial expression perception. *Journal of Experimental Psychology: Human Perception & Performance*, 26(2), 527–551.
- Cassidy, B., Harding, S., Hsu, K., & Krendl, A. (2019). Individual differences correspond with attention to the eyes of White versus Black faces. *Journal of Nonverbal Behavior*, 43(4), 435–449.
- Cassidy, B., Krendl, A., Stanko, K., Rydell, R., Young, S., & Hugenberg, K. (2017). Configural face processing impacts race disparities in humanization and trust. *Journal of Experimental Social Psychology*, 73, 111–124.
- Chen, H., Cohen, P., & Chen, S. (2010). How big is a big odds ratio? Interpreting the magnitudes of odds ratios in epidemiological studies. *Communication in Statistics—Simulation and Computation*, 39(4), 860–864. <https://doi.org/10.1080/03610911003650383>
- Chimielewski, M., & Kucker, S. (2020). An MTurk crisis? Shifts in data quality and the impact on study results. *Social Psychological and Personality Science*, 11(4), 464–473. <https://doi.org/10.1177/1948550619875149>
- Civile, C., McLaren, R., & McLaren, I. (2014). The face inversion effect—Parts and wholes: Individual features and their configuration. *Quarterly Journal of Experimental Psychology*, 67(4), 728–746.
- Cloutier, J., & Macrae, C. (2007). Who or what are you?: Facial orientation and person construal. *European Journal of Social Psychology*, 37, 1298–1309.
- Cloutier, J., Mason, M., & Macrae, C. (2005). The perceptual determinants of person construal: Reopening the social-cognitive toolbox. *Journal of Personality and Social Psychology*, 88(6), 885–894.
- Cloutier, J., Turk, D., & Macrae, C. (2008). Extracting variant and invariant information from faces: The neural substrates

- of gaze detection and sex categorization. *Social Neuroscience*, 3(1), 69–78.
- Curby, K., & Gauthier, I. (2010). To the trained eye: Perceptual expertise alters visual processing. *Topics in Cognitive Science*, 2(2), 189–201. <https://doi.org/10.1111/j.1756-8765.2009.01058.x>
- Dahl, C., Rasch, M., & Chen, C. (2014). The other-race and other-species effects in face perception—A subordinate-level analysis. *Frontiers in Psychology*, 5, 1068.
- Demoulin, S., Leyens, J., Paladino, M., Rodriguez-Torres, R., Rodriguez-Perez, A., & Dovidio, J. (2004). Dimensions of “uniquely” and “non-uniquely” human emotions. *Cognition and Emotion*, 18(1), 71–96.
- Fincher, K., Tetlock, P., & Morris, M. (2017). Interfacing with faces: Perceptual humanization and dehumanization. *Current Directions in Psychological Science*, 26(3), 288–293.
- Franklin, R., Jr., & Zebrowitz, L. (2016). Aging-related changes in decoding negative complex mental states from faces. *Experimental Aging Research*, 42(5), 471–478.
- Ganel, T., Goshen-Gotstein, Y., & Goodale, M. (2005). Interactions between the processing of gaze direction and facial expression. *Vision Research*, 45(9), 1191–1200.
- Green, P., & MacLeod, C. (2016). SIMR: An R package for power analysis of generalized linear mixed models by simulation. *Methods in Ecology and Evolution*, 7(4), 493–498.
- Harkness, K., Jacobson, J., Sinclair, B., Chan, E., & Sabbagh, M. (2012). For love of money? What motivates people to know the minds of others? *Cognition & Emotion*, 26(3), 541–549.
- Harkness, K., Sabbagh, M., Jacobson, J., Chowdrey, N., & Chen, T. (2005). Enhanced accuracy of mental state decoding in dysphoric college students. *Cognition & Emotion*, 19(7), 999–1025.
- Hugenberg, K., & Corneille, O. (2009). Holistic processing is tuned for ingroup faces. *Cognitive Science*, 33(6), 1173–1181.
- Hugenberg, K., Young, S., Rydell, R., Almaraz, S., Stanko, K., See, P., & Wilson, J. (2016). The face of humanity: Configural processing influences ascriptions of humanness. *Social Psychological and Personality Science*, 7(2), 167–175.
- Jenkins, J., & Langton, S. (2003). Configural processing in the perception of eye-gaze direction. *Perception*, 32(10), 1181–1188.
- Kass, R., & Raftery, A. (1995). Bayes factors. *Journal of the American Statistical Association*, 90(430), 773–795.
- Kesler, M., Andersen, A., Smith, C., Avison, M., Davis, C., Kryscio, R., & Blonder, L. (2001). Neural substrates of facial emotion processing using fMRI. *Cognitive Brain Research*, 11(2), 213–226.
- Khalid, S., Deska, J., & Hugenberg, K. (2016). The eyes are the windows to the mind: Direct eye gaze triggers the ascription of others' minds. *Personality and Social Psychology Bulletin*, 42(12), 1666–1677.
- Krumhuber, E., Lai, Y., Rosin, P., & Hugenberg, K. (2019). When facial emotions do and do not signal minds: The role of face inversion, expression dynamism, and emotion type. *Emotion*, 19(4), 746–750.
- Kunstman, J., & Maner, J. (2011). Sexual over-perception: Power, mating motives, and biases in social judgment. *Journal of Personality and Social Psychology*, 100(2), 282–294.
- Kuznetsova, A., Brockhoff, P., & Christensen, R. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, 82(13), 1–26.
- Lenth, R. (2018). emmeans: Estimated marginal means, aka least-squares means. R package version 1.4.7.
- Leyens, J., Paladino, M., Rodriguez-Torres, R., Vaes, J., Demoulin, S., Rodriguez-Perez, A., & Gaunt, R. (2000). The emotional side of prejudice: The attribution of secondary emotions to ingroups and outgroups. *Personality and Social Psychology Review*, 4(2), 186–197.
- Looser, C., & Wheatley, T. (2010). The tipping point of animacy: How, when, and where we perceive life in a fact. *Psychological Science*, 21, 1854–1862.
- Macrae, C., & Martin, D. (2007). A boy named Sue: Feature-based processing and person construal. *European Journal of Social Psychology*, 37, 793–805.
- Maurer, D., Le Grand, R., & Mondloch, C. (2002). The many faces of configural processing. *Trends in Cognitive Sciences*, 6, 255–260.
- McKelvie, S. (1995). Emotional expression in upside-down faces: Evidence for

- configurational and componential processing. *British Journal of Social Psychology*, 34, 325–334.
- Piepers, D., & Robbins, R. (2012). A review and clarification of the terms “holistic,” “configural,” and “relational” in the face perception literature. *Frontiers in Psychology*, 3, 559. <https://doi.org/10.3389/fpsyg.2012.00559>
- Rakover, S., & Teucher, B. (1997). Facial inversion effects: Parts and whole relationship. *Perception & Psychophysics*, 59(5), 752–761.
- Riddoch, M., Johnston, R., Bracewell, R., Boutsen, L., & Humphreys, G. (2008). Are faces special? A case of pure prosopagnosia. *Cognitive Neuropsychology*, 25(1), 3–26. <https://doi.org/10.1080/02643290801920113>
- Sato, W., Uono, S., Kochiyama, T., Yoshimura, S., Sawada, R., Kubota, Y., Sakihama, M., & Toichi, M. (2017). Structural correlates of reading the mind in the eyes in autism spectrum disorder. *Frontiers in Human Neuroscience*, 11, 361. <https://doi.org/10.3389/fnhum.2017.00361>
- Schein, C., & Gray, K. (2015). The eyes are the window to the uncanny valley: Mind perception, autism and missing souls. *Interaction Studies*, 16, 173–179.
- Senju, A., & Hasegawa, T. (2006). Do the upright eyes have it? *Psychonomic Bulletin & Review*, 13(2), 223–228.
- Shaver, P., Wu, S., & Schwartz, J. (1992). Cross-cultural similarities and differences in emotion and its representation. In M. Clark (Ed.), *Emotion* (pp. 175–212). Sage
- Smith, M., Cottrell, G., Gosselin, F., & Schyns, P. (2005). Transmitting and decoding facial expressions. *Psychological Science*, 16(3), 184–189.
- Stevenson, M., Soto, J., & Adams, R. (2012). More than meets the eye: The role of self-identity in decoding complex emotional states. *Emotion*, 12(5), 882–886.
- Vecera, S., & Johnson, M. (1995). Gaze detection and the cortical processing of faces: Evidence from infants and adults. *Visual Cognition*, 2, 59–87.
- Walter, S., Seibert, S., Goering, D., & O’Boyle, E., Jr. (2019). A tale of two sample sources: Do results from online panel data and conventional data converge? *Journal of Business and Psychology*, 34, 425–452. <https://doi.org/10.1007/s10869-018-9552-y>
- White, M. (1999). Representation of facial expressions of emotion. *American Journal of Psychology*, 112, 371–381.
- Wilson, J., Young, S., Rule, N., & Hugenberg, K. (2018). Configural processing and social judgments: Face inversion particularly disrupts inferences of human-relevant traits. *Journal of Experimental Social Psychology*, 74, 1–7. <https://doi.org/10.1016/j.jesp.2017.07.007>
- Yin, R. (1969). Looking at upside-down faces. *Journal of Experimental Social Psychology*, 81, 141–145.
- Young, A., Hellawell, D., & Hay, D. (2013). Configurational information in face perception. *Perception*, 42(11), 1166–1178.
- Young, S., Goldberg, M., Rydell, R., & Hugenberg, K. (2019). Trait anthropomorphism predicts ascribing human traits to upright but not inverted chimpanzee faces. *Social Cognition*, 37(2), 105–121.
- Young, S., & Hugenberg, K. (2010). Mere social categorization modulates identification of facial expressions of emotion. *Journal of Personality and Social Psychology*, 99(6), 964–977.
- Young, S., Tracy, R., Wilson, J., Rydell, R., & Hugenberg, K. (2019). The temporal dynamics of the link between configural face processing and dehumanization. *Journal of Experimental Social Psychology*, 85, 103883.

SUPPLEMENTAL MATERIAL

Experiment 1: Exploratory Model Including Valence

<i>Fixed Effect</i>	Decoding			
	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
(Intercept)	0.59	0.17	3.42	< .001
Inversion	−0.30	0.08	3.63	< .001
Valence [Positive]	0.53	0.29	1.85	.06
Valence [Neutral]	0.21	0.24	0.87	.39
Inversion * Valence [Positive]	−0.14	0.18	0.74	.46
Inversion * Valence [Neutral]	−0.02	0.15	0.17	.87

Note. Valence reference condition is Negative.

In Experiment 1, an exploratory model including Valence effects did not improve model fit over the model described in the main text, $\chi^2(4) = 3.47$, $p = .48$. Further, even when examined, Valence did not qualify the Inversion effect. A marginal effect of positive (relative to negative) valence may parallel work showing that minds are better attributed to targets signaling social acceptance than social rejection (Powers et al., 2014), that happy faces receive a lower threshold for mind perception than less positively valenced faces (Bowling & Banissy, 2017; Krumhuber et al., 2019), and that RME performance sometimes varies by valence (e.g., Franklin Jr. & Zebrowitz, 2016; Harkness et al., 2005). Future work may consider valence treated continuously to further probe this trend.

Experiment 1: Frequencies for Each Response per Item ($N = 40$ participants)

Item	Word 1	Word 2	Word 3	Word 4	Correct Response	Word 1: n	Word 2: n	Word 3: n	Word 4: n
playful	playful	comforting	irritated	bored	1	19	10	4	7
upset	terrified	upset	arrogant	annoyed	2	5	23	6	6
desire	joking	flustered	desire	convinced	2	2	8	28	2
insisting	joking	insisting	amused	relaxed	2	4	25	6	5
worried	irritated	sarcastic	worried	friendly	3	3	3	34	0
fantasizing	aghast	fantasizing	impatient	alarmed	3	3	31	4	2
uneasy	apologetic	friendly	uneasy	dispirited	3	3	5	25	7
despondent	despondent	relieved	shy	excited	1	30	3	3	4
preoccupied	annoyed	hostile	horrified	preoccupied	4	3	5	10	22
cautious	cautious	insisting	bored	aghast	1	20	11	4	5
regretful	terrified	amused	regretful	flirtatious	3	5	9	24	2
skeptical	indifferent	embarrassed	skeptical	dispirited	3	5	1	28	6
anticipating	decisive	anticipating	threatening	shy	4	4	22	4	10
accusing	irritated	disappointed	depressed	accusing	4	8	8	5	19
contemplative	contemplative	flustered	encouraging	amused	4	26	5	5	4
thoughtful	irritated	thoughtful	encouraging	sympathetic	2	5	25	3	7
doubtful	doubtful	affectionate	playful	aghast	1	17	10	8	5
decisive	decisive	amused	aghast	bored	1	17	11	4	8
tentative	arrogant	grateful	sarcastic	tentative	1	7	12	3	18
friendly	dominant	friendly	guilty	horrified	2	4	27	6	3
fantasizing	embarrassed	fantasizing	confused	panicked	2	1	35	3	1
preoccupied	preoccupied	grateful	insisting	imploring	1	21	3	6	10
defiant	contented	apologetic	defiant	curious	3	3	5	20	12
pensive	pensive	irritated	excited	hostile	1	26	7	4	3
interested	panicked	incredulous	despondent	interested	4	5	8	7	20
hostile	alarmed	shy	hostile	anxious	3	9	4	18	9
cautious	joking	cautious	arrogant	reassuring	3	3	29	5	3
interested	interested	joking	affectionate	contented	1	22	3	14	1
reflective	impatient	aghast	irritated	reflective	4	4	3	3	30
flirtatious	grateful	flirtatious	hostile	disappointed	3	3	32	5	0
confident	ashamed	confident	joking	dispirited	4	2	24	5	9

serious	serious	ashamed	bewildered	alarmed	1	27	2	6	5
concerned	embarrassed	guilty	fantasizing	concerned	4	2	4	10	24
distrustful	aghast	baffled	distrustful	terrified	4	5	7	26	2
nervous	puzzled	nervous	insisting	contemplative	2	8	13	13	6
suspicious	ashamed	nervous	suspicious	indecisive	3	3	4	28	5

Experiment 2: Frequencies for Each Response per Item ($N = 89$ participants)

Item	Word 1: Emotion	Word 2: Emotion	Word 1: N	Word 2: N	Gender	Male: <i>n</i>	Female: <i>n</i>
playful	playful	comforting	31	17	female	29	12
upset	arrogant	upset	11	37	male	34	7
desire	desire	flustered	0	48	female	26	15
insisting	amused	insisting	46	2	male	14	27
worried	worried	irritated	48	0	male	32	9
fantasizing	impatient	fantasizing	0	48	female	8	33
uneasy	uneasy	dispirited	30	18	male	36	5
despondent	despondent	excited	46	2	male	34	7
preoccupied	horrified	preoccupied	9	39	female	1	40
cautious	cautious	insisting	29	19	male	37	4
regretful	regretful	amused	36	12	male	37	4
skeptical	skeptical	dispirited	46	2	male	34	7
anticipating	shy	anticipating	13	35	male	41	0
accusing	irritated	accusing	47	1	male	11	30
contemplative	contemplative	encouraging	0	48	female	28	13
thoughtful	sympathetic	thoughtful	14	34	male	37	4
doubtful	doubtful	affectionate	23	25	female	6	35
decisive	decisive	amused	28	20	female	0	41
tentative	grateful	tentative	1	47	female	22	19
friendly	guilty	friendly	46	2	male	13	28
fantasizing	confused	fantasizing	6	42	female	1	40
preoccupied	preoccupied	imploring	0	48	female	17	24
defiant	defiant	curious	31	17	male	37	4
pensive	pensive	irritated	44	4	male	35	6
interested	incredulous	interested	0	48	female	2	39
hostile	hostile	anxious	48	0	male	31	10
cautious	arrogant	cautious	12	36	female	1	40
interested	interested	affectionate	32	16	female	1	40
reflective	impatient	reflective	2	46	female	8	33
flirtatious	hostile	flirtatious	4	44	female	0	41
confident	dispirited	confident	1	47	female	3	38

serious	serious	bewildered	33	15	male	40	1
concerned	fantasizing	concerned	39	9	male	20	21
distrustful	distrustful	baffled	2	46	female	24	17
nervous	insisting	nervous	14	34	female	3	38
suspicious	suspicious	indecisive	43	5	male	41	0

Experiment 3: Frequencies for Each Response per Item ($N = 89$ participants)

Item	Word 1	Word 2	Word 3	Word 4	Correct Response	Word 1: n	Word 2: n	Word 3: n	Word 4: n
playful	playful	comforting	irritated	bored	1	36	20	15	18
upset	terrified	upset	arrogant	annoyed	2	19	42	9	19
desire	joking	flustered	desire	convinced	2	6	14	63	6
insisting	joking	insisting	amused	relaxed	2	1	61	12	15
worried	irritated	sarcastic	worried	friendly	3	13	8	65	3
fantasizing	aghast	fantasizing	impatient	alarmed	3	10	56	16	7
uneasy	apologetic	friendly	uneasy	dispirited	3	4	15	62	8
despondent	despondent	relieved	shy	excited	1	56	15	12	6
preoccupied	annoyed	hostile	horrificed	preoccupied	4	10	8	17	54
cautious	cautious	insisting	bored	aghast	1	44	27	13	5
regretful	terrified	amused	regretful	flirtatious	3	22	11	52	4
skeptical	indifferent	embarrassed	skeptical	dispirited	3	11	13	58	7
anticipating	decisive	anticipating	threatening	shy	4	12	45	14	18
accusing	irritated	disappointed	depressed	accusing	4	11	16	9	53
contemplative	contemplative	flustered	encouraging	amused	4	63	10	4	12
thoughtful	irritated	thoughtful	encouraging	sympathetic	2	10	54	9	16
doubtful	doubtful	affectionate	playful	aghast	1	40	22	15	12
decisive	decisive	amused	aghast	bored	1	46	17	14	12
tentative	arrogant	grateful	sarcastic	tentative	1	5	13	21	50
friendly	dominant	friendly	guilty	horrificed	2	17	46	22	4
fantasizing	embarrassed	fantasizing	confused	panicked	2	9	69	7	4
preoccupied	preoccupied	grateful	insisting	imploring	1	54	10	14	11
defiant	contented	apologetic	defiant	curious	3	5	15	37	32
pensive	pensive	irritated	excited	hostile	1	55	15	9	10
interested	panicked	incredulous	despondent	interested	4	5	15	10	59
hostile	alarmed	shy	hostile	anxious	3	13	10	52	14
cautious	joking	cautious	arrogant	reassuring	3	2	62	19	6
interested	interested	joking	affectionate	contented	1	52	7	19	11
reflective	impatient	aghast	irritated	reflective	4	14	6	15	54
flirtatious	grateful	flirtatious	hostile	disappointed	3	3	63	12	11
confident	ashamed	confident	joking	dispirited	4	7	55	11	16

serious	serious	ashamed	bewildered	alarmed	1	47	10	19	13
concerned	embarrassed	guilty	fantasizing	concerned	4	1	19	18	51
distrustful	aghast	baffled	distrustful	terrified	4	9	15	57	8
nervous	puzzled	nervous	insisting	contemplative	2	14	38	19	18
suspicious	ashamed	nervous	suspicious	indecisive	3	4	5	70	10
chimpanzee	tame	alert	fierce	playful	4	7	10	13	59
tiger	aloof	ferocious	timid	obedient	2	7	71	5	6
deer	mischievous	temperamental	timid	clever	3	9	11	61	8
lion	gentle	friendly	brave	patient	3	3	6	73	7
leopard	quiet	agile	frail	lethargic	2	3	73	8	5
puppy	friendly	graceful	strong	savage	1	76	3	6	4
cat	barbaric	clumsy	brave	independent	4	1	18	12	58
raccoon	agile	stubborn	mischievous	affectionate	3	4	10	68	7
elephant	ferocious	lethargic	courageous	attentive	3	12	22	44	11
owl	alert	lazy	bold	restless	1	59	11	16	3
snake	sly	playful	bashful	cuddly	1	69	9	9	2
dolphin	cunning	hostile	sly	graceful	4	10	8	9	62
mouse	quiet	brave	cuddly	ferocious	1	64	3	17	5
shark	affectionate	clumsy	fierce	tame	3	2	7	73	7
sloth	hasty	lazy	obedient	antagonistic	2	5	72	10	2
bear	strong	dependent	friendly	warm	1	63	8	12	6
bat	happy	stubborn	evil	loving	3	11	14	58	6
donkey	graceful	aloof	agile	stubborn	4	6	22	10	51
fox	cunning	clumsy	foolish	repulsive	1	71	3	8	7
koala	lean	patient	cuddly	mean	3	1	8	73	7
pig	fast	graceful	dirty	cruel	3	1	4	81	3
rabbit	mean	hyper	tall	cunning	2	4	67	4	14
squirrel	bold	hyperactive	sluggish	malicious	2	10	66	7	6
wolf	solitary	slothful	villainous	reckless	1	60	8	15	6
eagle	proud	cowardly	oblivious	weak	1	75	7	6	1
alligator	wicked	arrogant	talkative	weak	1	56	27	6	0
turtle	energetic	delicate	hostile	slow	4	5	6	7	71
seal	melancholy	cruel	reserved	playful	4	8	6	11	64
otter	arrogant	clever	rash	strong	2	2	75	10	2
hyena	wild	affectionate	clumsy	tender	1	73	5	9	2

cheetah	obedient	swift	awkward	foolish	2	4	79	3	3
rat	handsome	sinister	generous	tough	2	9	59	4	17
bull	nice	small	slow	strong	4	3	8	17	61
weasel	lazy	patient	sneaky	sluggish	3	5	6	75	3
ostrich	alert	temperamental	beautiful	nervous	1	25	45	9	10
parrot	agile	talkative	mischievous	patient	2	2	57	27	3