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The Feeling of Being Watched: Do Eye Cues Elicit Negative Affect?

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A growing body of research has demonstrated that implicit social cues, such as images of watchful eyes, can promote prosocial behavior in a variety of settings. However, it remains unclear why this cooperative effect occurs. Nearly all research to date has focused primarily on proximate causes, such as an individual's concern about their "reputational" status. Yet, human gaze detection likely evolved as a threat-perception mechanism directing the brain's attention to (social) evaluation problems. Accordingly, in this study, we test, experimentally, whether exposing people to an image of watchful eyes elicits higher levels of negative versus position emotions compared to a control condition. Consistent with our hypothesis, we find that exposure to watchful eyes likely elicits higher levels of negative emotions (e.g., anxiety, distress, nervousness) while having virtually no effect on positive emotions. Thus, we propose that the watchful-eye effect may ultimately stem from the *feeling* of being watched.

Although it is well-established that people tend to be on their best behavior when they know that they are being observed by others (e.g., Ariely, Bracha, & Meier, 2009; Burnham, 2003; van der Linden, 2015; van Rompay, Vonk, & Fransen, 2009; Zajonc, 1965), a growing body of research finds that even artificial surveillance cues, such as images of "watchful eyes" can promote prosocial conduct across a wide range of behavioral domains, from mobilizing citizens to vote (e.g., Panagopoulos, 2014a, 2014b; Panagopolous & van der Linden, 2016) and charitable giving (Bateson, Nettle, & Roberts, 2006; Ernest-Jones et al., 2011) to cooperation in public good dilemmas (e.g., Burnham & Hare, 2007; Haley & Fessler, 2005).

One particularly important but currently unresolved question is *why* false impressions of observability promote prosocial behavior? Humans have a dedicated neural architecture for the detection of facial features (Haxby, Hoffman, & Gobbini, 2000), including the presence of eyes or

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so-called "gaze detection" (Emery, 2000). Gaze detection is an evolved cognitive mechanism that largely draws on areas of the brain that are not under voluntary control (Driver et al., 1999). Thus, images that merely resemble "watchful" human eyes can be sufficient to trigger the involuntary detection of another's directed gaze (Burnham & Hare, 2007; Mareschal, Calder, & Clifford, 2013).

A common explanation for prosocial behavior in response to gaze detection is rooted in the idea that subtle (implicit) social cues of being watched activate reputational concerns that motivate cooperative behavior (Baillon, Selim, & van Dolder, 2013; Haley & Fessler, 2005). Yet, whether people act altruistically out of fear of punishment for violating a norm or because of expectations of potential future rewards remains unclear (c.f., Oda et al., 2011; Oda, Kato, & Hiraishi, 2015). The neural systems responsible for gaze detection likely evolved as a mechanism for (predatory) threat-detection (Haxby, Hoffman, & Gobbini, 2002). Indeed, the ability to recognize danger quickly is evolutionarily adaptive and strongly relies on the preferential processing of dedicated neural circuitry. For example, simple shapes can automatically activate neural networks responsible for threat perception (Larson et al., 2009). In fact, human attention is biased towards emotionally salient stimuli that possess threat-related potential (Öhmann, 2005), of which staring or watchful human eyes are a prime example. Directed gaze is often perceived as aggressive and threatening and commonly elicits negative emotions such as worry and fear (Frischen, Bayliss, & Tipper, 2007; Haxby et al., 2002). Importantly, directed (rather than averted) gaze appears to be driving the watchful-eye effect (Manesi, van Lange, & Pollet, 2016).

This dedicated neural circuitry is part of the "social brain." Humans evolved living in groups and social attention is primarily conveyed by gaze (Emery, 2000). In particular, eyes communicate subtle but crucial signals, such as hints about the intentions and goals of conspecifics (Nummenmaa & Calder, 2009). Humans are dependent on eye cues when it comes to social decision making (Haxby et al., 2002) and watchful eyes have shown to heighten social awareness and self-evaluation (Baltazar et al., 2014; Pfattheicher & Keller, 2015). For example, research shows that the gaze of others can induce social anxiety (Tsuji & Shimada. 2015), especially among people high in need for social approval, who are typically more susceptible to observer-effects (Pfattheicher & Keller, 2015; van Rompay, Vonk, & Fransen, 2009).

In short, here we explore the notion that the watchful-eye effect may literally stem from the *feeling* of being watched. Specifically, if eyespot images indeed trigger implicit (social) threat-perception, we hypothesize that exposure to watchful eyes should lead to the experience of negative

affect (e.g., anxiety, worry), which, as discussed, is often responsible for directing the brain's attention to social evaluation and decision-making problems in the first place. Thus, we advance the literature by testing, experimentally, whether priming people with directed watchful eyes elicits specific negative emotions.

METHOD

Sample and Participants

Participants (N = 524) were recruited via Amazon's Mechanical Turk and the survey was conducted using the SurveyMonkey interface on May 24-25, 2012. Studies show that respondents recruited in this manner are often more representative of the U.S. population than in-person convenience samples but less representative than national panels or probability samples (Buhrmester et al., 2011). Overall, our sample was 63 percent male, 44 percent white, 47 percent Asian, 6 percent African-American, 3 percent Latino, and 80 percent had completed college or had a postgraduate degree; the mean age in our sample was 30 years.

Design and Procedure

To examine the mechanisms that give rise to eyespot effects, we designed a randomized experiment imbedded in an online survey about politics. Following Haley and Fessler (2005), our study randomized an image that appeared at the beginning of the survey. Respondents either saw an American flag (placebo)[1] or a pair of eyes (treatment) on the welcome screen (Figure 1). After exposure to the treatment, participants answered a few questions about their background before they completed items from the *Positive and Negative Affect Scale* (PANAS; Watson et al., 1988). Lastly, participants answered a few questions about voting and politics (e.g., how often do you talk to your friends and family about politics?). The randomization procedure yielded experimental groups that were balanced in terms of their socio-demographics. To confirm, a logistic regression predicting treatment assignment as a function of demographic covariates was non-significant (LRchi2(8) =5.81, p=.67).

Measures

To determine whether exposure to the eyespot image on the welcome page affected subjects' emotional states, they were asked to respond to the following item: "A number of words and phrases that describe

[1] The American flag was adopted as a control condition primarily because it has been used successfully as a placebo in previous eyespot studies (e.g., see Panagopoulos 2014a, 2014b).

different feelings and emotions appear below. Please indicate to what extent you feel this way right now. Read each item and then mark the appropriate answer in the space next to that word. Use the following scale to record your answers: "1 = Very slightly or not at all; 2 = A little; 3 = Moderately; 4 = Quite a bit; 5 = Extremely." Drawing on items from the *Positive and Negative Affect Scale* (PANAS), we probed subjects on the following 15 discrete emotions, asking about the extent to which they felt; cheerful, disgusted, sad, afraid, happy, upset, angry, nervous, proud, ashamed, scared, enthusiastic, distressed, anxious or confident. Scholars have classified five of these discrete emotions as positive (cheerful, happy, proud, enthusiastic, confident), while the rest have been identified as negative emotions (Watson et al., 1988).

FIGURE 1 Image of Watchful Eyes

RESULTS

We analyzed participants' responses to the emotional items battery to determine whether individuals exposed to eyespots on the survey welcome screen reported experiencing different emotional levels relative to those who were not exposed to eyespots. Descriptive results, including mean emotion levels by experimental condition, are provided in Table 1. Although the effect-sizes are relatively small (Cohen, 1992), the results seem to reveal that subjects exposed to eyespots were more likely to report feeling scared (M_t = 1.96 *vs*. M_c = 1.81), anxious (M_t = 2.40 *vs*. M_c = 2.26), nervous (M_t = 2.11 *vs*. M_c = 1.98) and distressed (M_t = 2.12 vs. M_c = 2.02), in particular, compared to participants assigned to the control condition. Differences in levels of other negative emotions trended in the same direction, with the exception of moral emotions, such as shame and disgust, for which no significant differences were found across the two groups. We also created two composite measures, classifying the discrete emotions about which we probed respondents into positive (α = 0.86) or negative feelings (α = 0.94), as described above. Results suggest that

subjects assigned to the treatment condition reported a somewhat heightened level of negative emotion, while there were no detectable differences (d = 0) in the levels of positive sentiment (e.g., happy, cheerful) overall across the two groups.

TABLE 1 Mean Self-reported Positive & Negative Affect by Experimental Condition[1]

Emotion	$M_{Control}$	$M_{Treatment}$	Cohen's d
Scared	1.81	1.96	.13
Anxious	2.26	2.40	.12
Nervous	1.98	2.11	.11
Distressed	2.02	2.12	.09
Upset	1.89	1.96	.06
Afraid	1.82	1.88	.05
Sad	1.92	1.97	.04
Angry	1.90	1.92	.02
Disgusted	1.82	1.81	.01
Ashamed	1.78	1.77	.00
Enthusiastic	3.10	3.21	.09
Cheerful	3.31	3.24	.06
Confident	3.56	3.52	.03
Proud	3.07	3.02	.03
Happy	3.52	3.55	.03
Positive[2]	*3.31*	*3.31*	*.00*
Negative[3]	*1.92*	*1.99*	*.08*
Negative(short)[3]	*2.02*	*2.16*	*.14*

NOTES:
[1] Control group (n = 251) and treatment group (n = 273).
[2]Positive denotes an additive index (α = 0.86) comprised of the following five discrete emotions: confident, enthusiastic, proud, happy, & cheerful, divided by 5.
[3]Negative denotes an additive index (α = 0.94) comprised of the following ten discrete emotions: scared, anxious, distressed, upset, nervous, afraid, angry, disgusted, ashamed, and sad, divided by 10. The short version of the scale includes only scared, anxious, and nervous (α = 0.80).

Some of the negative emotions about which we probed subjects, including shame, anger, and disgust, have been classified primarily as moral emotions (Haidt, 2003). To hone in on the emotions that are conceptually most relevant to threat-perception, we also created a shorter index (α = 0.80) comprised of three negative emotions (scared, anxious, nervous). Results are displayed in Figure 2 and trend towards the finding that those participants exposed to the eyespot treatment were more likely to report feeling anxious, scared, and nervous, compared to the control

condition (M_t = 2.16, SE = 0.06 > M_c = 2.02, SE = 0.06, t(522) = 1.63, p = 0.05, Cohen's d = 0.14, one-tailed). Notwithstanding the fact that power limitations may add murkiness to our estimates, it is worth noting that the results are broadly consistent with our expectations.[2] Overall, subjects exposed to eyespots reported feeling more negative emotions compared to controls, whereas we find little to no evidence that exposure to eyespots raised levels of positive emotions in any meaningful way.

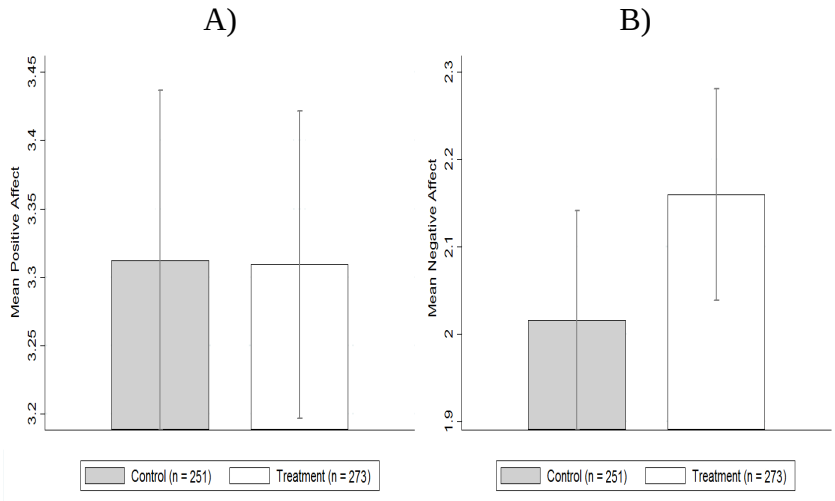

FIGURE 2 Mean Positive & Negative Affect by Experimental Condition

Note: Error bars represent 95% confidence intervals. Panel A reports mean differences in positive affect. Panel B reports mean differences in negative affect (short version) between the treatment and control groups.

DISCUSSION AND CONCLUSION

With some notable exceptions (e.g., Fehr & Schneider, 2010), a growing body of research has reported that mere images of watchful eyes can facilitate prosocial behavior in both laboratory and naturalistic settings across a wide range of behaviors (e.g., Burnham & Hare, 2007; Ernest-Jones, Nettle, & Bason, 2011; Panagopoulos, 2014a). Although

[2] From a nonparametric perspective, 8 out of the 10 negative emotions show higher averages for the treatment group, whereas 3 out of the 5 positive emotions show lower averages. Compared to random chance (50%), the binomial (11/15) and cumulative binomial probability of observing at least 11 out of 15 trials in the expected direction are (p = 0.04) and (p = 0.059), respectively.

these results are intriguing, the question of *why* this effect occurs has remained largely unclear. In this study, we set out to investigate what psychological mechanisms might underlie the watchful-eye effect. The most common explanation offered in the literature for why people act prosocially when under the impression of being watched revolves primarily around reputational concerns (e.g., see Baillon et al., 2013; Pfattheicher & Keller, 2015). Specifically, Oda, Kato, and Hiraishi (2015) argue that reputational strategies either stem from a negative (e.g., fear of punishment for violating social norms) or positive motivation (e.g., desire to uphold a good reputation). In the present study, we take a step back and reflect on the notion that human gaze detection likely evolved as a threat-perception mechanism (Haxby et al., 2002). In fact, the human brain has dedicated neural circuitry geared towards preferentially processing negative threat-related information, including "directed gaze" (Mareschal et al., 2013; Öhmann, 2005).

Consistent with the threat-hypothesis, we find some preliminary evidence that, compared to the controls, respondents who were exposed to images of watchful eyes reported feeling higher levels of negative emotions, including anxiety, distress, and nervousness. At the same time, we find little to no evidence that images of staring eyes increase the experience of any positive emotions (e.g., happiness, cheerfulness) relative to a control condition. Thus, it is likely that the "watchful-eye" effect originates from the *feeling* of being watched. The experience of negative emotions (e.g., worry, anxiety) biases our attention towards threat-related stimuli and puts the brain in a heightened state of awareness. Proximate explanations of prosocial behavior in these contexts, such as concern about one's reputational status or fear of violating a social norm (i.e., social comparison) may be triggered by an elevated negative emotional state. For example, research shows that another's gaze can heighten self-awareness and induce social anxiety, especially among those who are likely to seek social approval (Tsuji & Shimada, 2015). Although these findings are congruent with recent research highlighting that watchful eyes may elicit fear of punishment more so than any positive motivation to act prosocially (Oda et al., 2015), it is worth noting that gaze cues from potential out-group members may also directly be perceived as threatening without the need for any explicit reputational motives or concerns.

Of course, the present study is not without limitations. First, the evidence presented here is preliminary and should be interpreted with some caution given the fairly small effect-sizes and limited representativeness of our overall sample. Accordingly, we encourage future research to replicate these findings and extend our hypotheses in a novel direction, for example, by assessing the extent to which the

experience of negative affect mediates motivations to act prosocially in real-world social dilemmas (e.g., see also Pfattheicher & Keller, 2015). Notwithstanding these limitations, this study is the first to report that eyespot primes may elicit negative emotions.

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