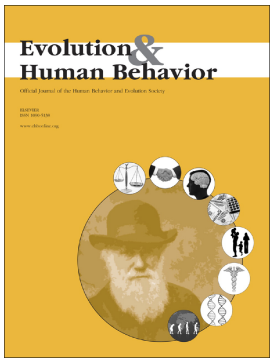

Attentiveness to eyes predicts generosity in a reputation-relevant context

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Attentiveness to eyes predicts generosity in a reputation-relevant context

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Eyes play a vital role in human social interactions. In fact, some prior work indicates that simply the presence of eyes or eye-like stimuli increases people's prosocial behavior, arguably because the eyes serve as cues of being watched and thus elicit reputational concerns. The current study was designed to address two questions in this regard. First, we examined how salient the eyes are among the human features. Second, we asked whether individual differences in attentiveness to eyes (but not other human features such as ears or hands) are predictive of reputation-enhancing behavior. Using an eye-tracking paradigm, we found that participants looked longest to eyes compared to other human features. Critically, greater attentiveness to eyes correlated with greater generosity on a donation task, but only in a reputation-relevant context (i.e., when donations were public but not when they were anonymous). Attentiveness to other human features did not predict donation behavior. Eyes are thus an especially salient human feature, and attentiveness to eyes may signal individuals' concerns about their reputations.

Keywords: watching eyes, reputation, cooperation, prosocial behavior

Attentiveness to eyes predicts generosity in a reputation-relevant context

Eyes play a critical role in helping us navigate our social environment. They allow us to detect the presence and some of the contents of other minds, and they are vital for initiating, maintaining, and regulating collaborative interactions (Grossmann, 2017). These vital social functions lead the eyes to be highly salient to humans. For instance, humans focus more heavily on the eye region when scanning faces than chimpanzees (Kano & Tomonaga, 2010). Furthermore, when following others' gaze, human infants use eye gaze direction whereas other great apes rely more on head direction (Tomasello, Hare, Lehmann, & Call, 2007). Eyes thus attract attention and guide human social behavior from early in development.

In addition, eyes are thought to serve vital cooperative functions. In particular, the presence of eyes has been found to increase prosocial behavior, both in economic games and in real-life contexts (the so-called "watching eyes" effect; see Nettle et al., 2013, for a review). For instance, adults gave significantly more money towards a common good when an image of a pair of eyes was visible during the donation compared to when an inanimate object (e.g., flower) was present (e.g., Bateson, Nettle, & Roberts, 2006). This effect has been demonstrated across a range of prosocial behaviors, such as increased removal of litter, increased voter turnout, reduced bicycle theft, and so on (e.g., Bateson, Callow, Holmes, Redmond Roche, & Nettle, 2013; Burnham & Hare, 2007; Ekström, 2012; Ernest-Jones, Nettle, & Bateson, 2011; Haley & Fessler, 2005; Nettle, Nott, & Bateson, 2012; Panagopoulos, 2014a, 2014b).

This cooperation-enhancing effect of eyes is thought to arise from people's strong motivation to manage their reputations (Bateson et al., 2006; Haley & Fessler, 2005).

Human cooperative behavior is arguably maintained in large part by the reputational costs that individuals incur when they break cooperative norms (Fehr & Gächter, 2002; Milinski, Semmann, & Krambeck, 2002; Wedekind & Milinski, 2000). As a result, adults and even young children behave more prosocially when being watched by others (e.g., Bull & Gibson-Robinson, 1981; Engelmann, Herrmann, & Tomasello, 2012; Kurzban, 2001; Piazza, Bering, & Ingram, 2011). Since eyes or eye-like stimuli cue that one is being watched, they trigger similar reputational concerns and thus increase prosociality (Haley & Fessler, 2005).

In spite of the many studies showing an effect of watching eyes on a variety of prosocial behaviors, the robustness of the phenomenon has been called into question by studies that have failed to find the effect (Carbon & Hesslinger, 2011; Fehr & Schneider, 2010; Saunders, Taylor, & Atkinson, 2016; Sparks & Barclay, 2015). Indeed, a recent meta-analysis found that artificial surveillance cues do not reliably increase generosity (Northover, Pederson, Cohen, & Andrews, 2017). Additionally, some studies indicate that the effect is apparent under certain conditions but not others. For instance, there is some evidence that eye images increase prosocial behavior toward in-group but not out-group members (Mifune, Hashimoto, & Yamagishi, 2010), and that the effect is modulated by the number of real people in the vicinity (e.g., Bateson et al., 2013; Powell, Roberts, & Nettle, 2012). Moreover, a meta-analysis of 25 studies showed that the effect emerges reliably after short exposures to images of eyes, but not after long exposures (Sparks & Barclay, 2013; though see Panagopoulos, 2014b). Given these mixed findings, the jury is still out on the robustness and the generalizability of the cooperation-enhancing effect of watching eyes.

An important way to advance our understanding of this phenomenon is to inquire about the moderating role of individual differences. That is, is the watching eyes effect more apparent in individuals with certain characteristics? One participant characteristic that seems especially meaningful to consider is how concerned individuals are about their own reputations. Specifically, individuals who are more concerned about their reputations could plausibly be more sensitive to cues that trigger reputational concerns. One may thus predict that individuals who are more attentive to reputation-management cues such as eyes should also show greater prosociality when their reputations are at stake. That is, individuals' propensity to attend to eyes, insofar as it serves as an index of their reputational concern, should be related to how generous they are in situations in which they can enhance their reputations but not in situations in which they cannot enhance their reputations. Our first goal in the present study was to test this prediction.

Importantly, if the propensity to attend to eyes really is an index of reputational concern, then we may additionally predict that individuals' propensity to attend to other human features (such as the ears or hands) should *not* show a similar association with generosity in reputation-relevant situations. This is because whereas all human features cue the presence of another person, which may serve important functions such as making individuals feel more social or reminding them that they are part of a group, the eyes are unique among the human features in their "monitoring" function and are therefore an especially relevant cue for reputation-management (see Manesi, Van Lange, & Pollet, 2016). Thus, if attentiveness to eyes does index individuals' reputational concerns, then we should see a specific association between attentiveness to eyes and prosocial behavior in a reputation-relevant context but should see no association between attentiveness to

other human features in the same context. Our second goal was thus to test for the specificity of this association.

The present study was designed to address these important questions about the cooperative functions of eyes. We first presented participants with pictures of eyes among pictures of other human features and used an eye tracker to assess participants' attentiveness to eyes versus the other features. Participants were then given a 'windfall' of $10 and the opportunity to donate money. Half the participants donated publicly and the other half donated anonymously. Given the evidence that eyes are a highly salient stimulus, we predicted that participants would attend more to eyes than to other human features. Furthermore, based on our proposal that greater attentiveness to cues that trigger reputational concerns (eyes) should be associated with greater reputation management, we predicted that participants' attentiveness to eyes (but not to the other human features) would be associated with their donation amount, but only when their reputations were at stake (i.e., in the public but not the anonymous donation context).

Method

Participants

The final sample consisted of 131 undergraduate students (M_{age} = 18.89 years, *SD* = 1.13; 71.8% Female). The majority of the participants were Caucasian (66.4% Caucasian, 21.4% Asian, 5.3% African American, and 6.9% other). An additional 7 students participated but were excluded for having eye-tracking data for less than 20% of their total trials (n = 4) or because they were outliers (gaze duration to eyes was more than 3 absolute deviations from the median; n = 3; see Results for more information). Participants were assigned to one of two conditions: public donation (n = 65) or

anonymous donation (n = 66). There were no significant differences in gender or race distribution across conditions (all ps > .24). Participants were compensated with course credit and up to $10 based on their decision in the donation task. The procedures were approved by the authors' institutional IRB and all participants provided informed consent.

Design and Materials

Participants viewed a series of circular arrays (76 cm in diameter) with six equidistant and equal-sized pictures of human features (2.54 x 5.08 cm each). Each array contained a photo of eyes, nose, mouth, ear, hands, and feet. Further, there were four different types for each feature. For example, there were brown male eyes, blue male eyes, brown female eyes, and blue female eyes. In total, participants viewed 24 arrays in a randomized order with positions and types of human features counterbalanced within and across participants. Pictures of facial features were taken from a previously validated FACES database (http://faces.mpib-berlin.mpg.de). The areas of the eyes, nose, and mouth were individually cropped from photographs of Caucasian male and female models (ages 19-30) displaying neutral expressions. All of these facial features were forward facing (e.g., gaze of eyes was directed towards the participant). In addition, pictures of ears, hands, and feet were taken from Google Images. Regions of Interest (ROIs) were created using Tobii Studio (Version 3.3.0; Tobii Technology, Stockholm, Sweden). ROIs of 225 x 150 pixels were created to be non-overlapping and encompassing the entirety of each individual feature on the display. Animated distractors provided by Tobii Studio were placed randomly between trials to regain participants' attention. (Note that participants were also presented trials containing facial features

amongst inanimate objects such as a car or a bowl in the same circular configuration, as well as trials containing neutral-expression faces. However, the present study only discusses findings from the trials featuring human features.)

Eye tracking procedure

In a lab setting, participants sat approximately 60 cm from a 24-inch monitor (52 cm × 32 cm) with a resolution of 1680 x 1050 pixels. The eye tracking unit (Tobii model X120; Tobii Technology, Stockholm, Sweden) with bright pupil capture setting (see also Jackson and Sirois, 2009) was positioned below the monitor and measured participants' eye movements at a sampling frequency of 60 Hz. Stimulus presentation and data recording were carried out using Tobii Studio. First, participants completed a 9-point calibration procedure. They were then instructed by the experimenter to freely gaze at the display but were not given further instructions about where to direct attention. The experimenter then went behind a curtain, out of the participant's view, and initiated the stimulus presentation. Each trial consisted of three segments: 1) blank screen for .5 s, 2) fixation cross for 1 s, and 3) circular array for 5 s.

Donation Task

After the presentation of the arrays of human features, the following announcement appeared on the screen: "As a token of our appreciation, we'd like to give you $10 for participating in the study. In addition, part of our lab is involved in raising money to promote child development (e.g., buying toys and educational materials). You may elect to donate any amount of money you have earned as part of your participation in this study." Participants were able to select donation amounts on the screen in dollar intervals ranging from $0 to $10. In the anonymous condition, the announcement

additionally stated, "Your donation is completely voluntary and anonymous." In addition, participants in the anonymous condition were instructed to see themselves out and, upon exiting the experimental room, to collect the remaining dollar amount (i.e., $10 minus the amount they had donated) in an envelope placed on a table. In contrast, the instructions in the public condition did not guarantee anonymity and instead stated that the researcher would hand the remaining dollar amount to the participant at the end of the study.

In both conditions, unbeknownst to the participant, the experimenter watched a monitor that mirrored the participant's screen. The experimenter was able to see how much money the participant donated and to then place the correct remaining dollar amount in an envelope. In the anonymous condition, after the participant selected the donation amount, the experimenter exited through a doorway (occluded by the curtain) and left the remaining dollar amount on a table in an adjacent room. In the public condition, after the participant selected the donation amount, the experimenter pulled back the curtain and handed the envelope to the participant.

Results

The data used in the analyses reported below are available at http://dx.doi.org/10.17632/vvhw3rky3y.1

Preliminary analyses

For gaze duration towards eyes, three cases exceeded 3 absolute deviations from the median; these outliers were excluded from analyses (following Leys, Ley, Klein, Bernard, & Licata, 2013). Note, however, that the pattern of all results remained the same with the outliers included.

Additionally, we performed a series of repeated measures ANOVAs and found no significant differences in gaze duration across the four types of each feature (e.g., male blue eyes, female blue eyes, male brown eyes, and female brown eyes) or across the six positions along the circular array for any feature (eyes, nose, mouth, ears, hands, and feet); therefore, averages for gaze duration were pooled for each individual feature across all 24 trials.

Finally, as the distribution for donation amount was not normal, the variable was dichotomized to exhibit donating half or less ($0-$5) versus greater than half ($6-$10). Fifty-three participants (40.5%) donated half or less ($0-$5) and 78 participants (59.5%) donated more than half of their money ($6-10).

Gaze duration

A repeated-measures ANOVA was conducted with gaze duration to each of the six features as dependent measures. Overall, there was a significant difference in gaze duration across features, $F(5,650) = 30.02$, $p < .001$, $\eta_p^2 = .19$ (see Figure 1). Specifically, after applying a Bonferroni correction, the average gaze duration towards eyes ($M = .62$, $SD = .26$) was significantly longer than towards all other features ($p < .001$). The average gaze duration to the other features was as follows: nose: $M = .42$, $SD = .23$; mouth: $M = .44$, $SD = .16$; ears: $M = .48$, $SD = .19$; hands: $M = .43$, $SD = .16$; feet: $M = .49$, $SD = .19$.

Attentiveness to eyes and donation behavior

A binary logistic regression was conducted with gaze duration to eyes and condition (public vs. anonymous) predicting donation behavior ($0-$5 vs. $6-10). Overall, the model significantly predicted donation behavior, $X^2(3, N = 131) = 8.54$, $p = .04$, $R^2 = .09$. Specifically, there was a significant interaction between condition and gaze

duration to eyes, β = 3.96, OR = 52.39, p = .01 (Figure 2). In the public condition, those who gazed more at eyes were more likely to donate $6-10 than those who gazed less at eyes (β = 2.38, OR = 10.83, p = .03). In the anonymous condition, the difference was not significant (p = .17).

The same analysis (a binary logistic regression with condition and gaze behavior predicting donation) was conducted for each of the other features (i.e., mouth, nose, ears, hands, and feet). However, none of these analyses revealed any significant effects. Thus, the model with condition and gaze duration to eyes was the only significant predictor of donation behavior.

Discussion

Eyes serve critical functions in human social interactions. They enable us to detect the presence and some of the contents of other minds and are vital for social cognition and collaborative interactions (Grossmann, 2017; Kampe, Frith, & Frith, 2003). Additionally, they are believed to enhance cooperation by eliciting reputational concerns (Bateson et al., 2006; Haley & Fessler, 2005). Based on these important functions of eyes, we predicted 1) that eyes should be more salient and attract greater attention than other human features, and 2) that individuals' attentiveness to eyes, insofar as it reflects participants' reputational concerns, should be associated with their prosocial behavior in a public context (i.e., when their reputation is at stake), whereas attentiveness to the other human features should not be associated with prosocial behavior in this context.

To test the first prediction, we used eye tracking and assessed how much attention participants paid to pictures of eyes versus several other human feature (nose, mouth, ears, hands, and feet). We found that as a group, participants attended more to eyes than

to any other human feature. This finding is an important extension of prior work; specifically, whereas prior work suggests that humans attend more to eyes than do other primates when scanning faces (e.g., Kano & Tomonaga, 2010), it had remained unclear whether eyes are given preferential attention when presented in isolation and compared to a host of facial and non-facial human features. It has thus been difficult to know whether the eyes are especially salient among the human features, or whether any stimulus that signals the presence of a human being attracts similar attention. Our finding demonstrates that humans do indeed preferentially orient to eyes over other human features. This selective attention to eyes likely reflects the critical social functions that eyes serve in human social interactions (see Grossmann, 2017; Kampe et al., 2003).

Our second question was whether individual variation in reputational concern, as indexed by variation in attentiveness to eyes, predicts prosocial behavior. We reasoned that if this is the case, then individual variation in attentiveness to eyes should be associated with individual variation in degree of prosociality, but only when individuals' reputation is at stake. Our results supported this hypothesis. Specifically, participants who donated more than half of their money attended more to eyes during the eye tracking task than participants who donated half or less of their money, but only in the public donation context (when the experimenter would know how much participants donated). No such association was found in the anonymous donation context (when no one would know how much participants donated). Importantly, attentiveness to the other human features was not associated with donation behavior in either context.

These findings support the idea that to the degree that the presence of eyes does promote cooperation, the underlying mechanism is likely reputational concern. First, only

participants' attentiveness to eyes – and not their attentiveness to any other human feature – was associated with their donation behavior. This is important because whereas all human features cue the presence of others (which may serve important functions such as making individuals feel more social or reminding them that they are part of a group), the eyes are unique in their "monitoring" function and are therefore especially relevant for reputation-management (see Manesi et al., 2016). If individuals' attentiveness to all human features had been found to be associated with their donation behavior, therefore, we could only have concluded that individuals' sensitivity to the presence of others predicts their generosity. However, we found an eyes-specific association, which suggests that it is not simply the sensitivity to the presence of others but rather the sensitivity to reputation-related cues specifically that predicts individuals' generosity. This also complements prior work showing that eyes with direct gaze (i.e., eyes that "watch" us and monitor our behavior) increase prosocial behavior more than eyes with averted gaze or closed eyes (Manesi, Van Lange, & Pollet, 2016), suggesting that it is not simply any indicator of human presence nor simply the presence of eyes, but specifically being watched that is associated with cooperation.

Second, this association between attentiveness to eyes and donation behavior was found only in the public donation context, i.e., when participants believed that the experimenter would give them the remainder of their money and would thus know how much they had donated. In the anonymous donation context (when participants were told that their donation was anonymous and that they would receive the remainder of their money without encountering the experimenter or anyone else), participants' attentiveness to eyes was not associated with their donation behavior. Thus, only when participants'

reputations were at stake did the association between attentiveness to eyes and prosocial behavior become apparent. This result aligns with prior work showing that reputation considerations play a greater role in people's cooperative behavior when those decisions are made publicly versus anonymously, even if the 'public' only consists of the experimenters (e.g., Andreoni & Petrie, 2004; Lamba & Mace, 2010). Together, these findings strengthen the argument that the association between attentiveness to eyes and prosocial behavior is explained by reputational concerns.

We certainly do not mean to suggest that eyes *only* serve a monitoring and reputation-building function. The eyes undoubtedly play a key role in social interactions and social cognition, such as inferring others' attentional, emotional, or mental states during social interactions as well as enabling coordination (Grossmann, 2017; Kampe et al., 2003). There are thus many reasons why people attend more to eyes than to other human features, and attentiveness to eyes does not only reflect reputational concern. Nonetheless, there is evidence that eyes do increase people's sense of being watched and render people's reputation systems salient (Haley & Fessler, 2005; Oda, Niwa, Honma, & Hiraishi, 2011; Pfattheicher & Keller, 2015). Our findings complement this literature nicely. Specifically, the fact that the correlation between attentiveness to eyes and prosocial behavior was only evident in the public donation context (when participants' reputations were at stake) suggests that attentiveness to eyes is at least in part an implicit indicator of reputational concern. However, far more research is needed to confirm this interpretation, such as by examining whether attentiveness to eyes correlates positively with other measures of reputational concern or by measuring whether increasing participants' reputational concern results in greater attentiveness to eyes.

The present study contributes to our understanding of how participant traits and context might moderate the watching eyes phenomenon. In particular, our findings hint that individual variation in reputational concern can partially account for variations in prosocial behavior in reputation-relevant contexts. In support of this interpretation, a recent study revealed that individuals with strong chronic public self-awareness (who are likely more concerned about their reputations) were more generous in the presence of watching eyes than the absence of watching eyes, whereas individuals with weak chronic self-awareness did not show this effect (Pfattheicher & Keller, 2015). Together, these studies indicate that it is incorrect to assume, as much prior work in this area has done, that all individuals are similarly highly motivated to manage their reputations.

An interesting question that arises is what explains these individual differences in reputational concern. It seems plausible that individuals' upbringing and culture influence how motivated they are to manage their reputations. For instance, highly independent cultures may promote the idea that one should behave as one wants to regardless of what others think, whereas more interdependent cultures may emphasize following the norms of the group and paying attention to how one's actions are perceived by others; these sorts of differences may enhance or reduce people's tendency to engage in reputation management (see, e.g., Kim & Sharkey, 1995; Singelis & Sharkey, 1995). Of course, as with any trait, the tendency to be concerned about one's reputation likely varies naturally across individuals, but external factors may well modulate this tendency. It will be fascinating for future work to better understand this variation and its origins.

We may venture, based on our results, that part of the explanation for the mixed findings on the watching eyes effect might be that studies on this topic have been

conducted with samples from different populations (different cultures, age groups, socioeconomic backgrounds, and so on), which may consist of larger or smaller proportions of individuals with high reputational concerns. In groups with smaller proportions of such individuals, the effect might not emerge for the whole group, whereas it might emerge for groups with larger proportions of such individuals. Future research in this area should thus account for individual variation in reputational concern and examine whether including this variation increases the robustness and generalizability of the basic watching eyes effect.

Finally, two aspects of our study are worth noting here. First, a large proportion of our participants – nearly 60% – donated more than half of their money. Such a high level of generosity may seem surprising. However, prior work has shown that donation levels are higher when the initial endowment is obtained through a 'windfall' than when it is earned, and also when the donation decision is made on a computer screen than with tangible cash in hand (Reinstein & Riener, 2012). Importantly, though, even with such a high degree of generosity, we did see sufficient variation across individuals and conditions to detect interesting and meaningful effects.

Second, the association that we found between attentiveness to eyes and generosity is correlational and so does not permit causal conclusions. Our interpretation of this correlation is that a participant's attention to eyes and generosity in the public context are both reflections of the participant's underlying reputational concern. However, it is possible that greater attention to eyes might actually have *triggered* participants' reputational concerns and thus increased their prosociality in the public context, that is, that participants who happened to pay more attention to eyes became

more concerned about their reputations as a result. This causal connection is one that our study cannot speak to, but that would be fascinating to explore in future work in order to further elucidate the mechanisms of the watching eyes effect specifically and reputation and cooperation more generally.

To conclude, the results of this study show that people pay special attention to eyes compared to other human features, and that greater attentiveness to eyes predicts greater generosity and may serve as an index of reputational concern. The eyes are thus especially salient human features that play a vital function in maintaining human cooperation.

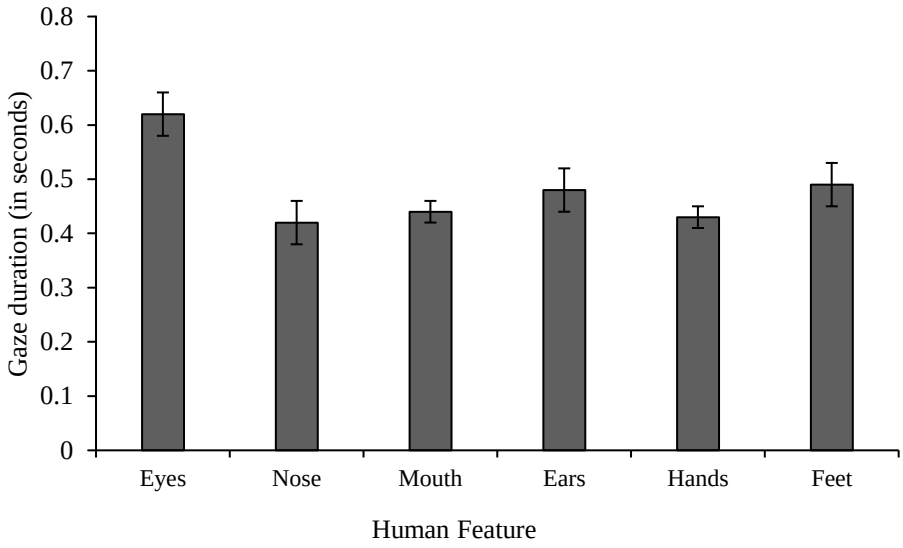

Figure 1. Average gaze duration to each human feature. Error bars indicate standard errors.

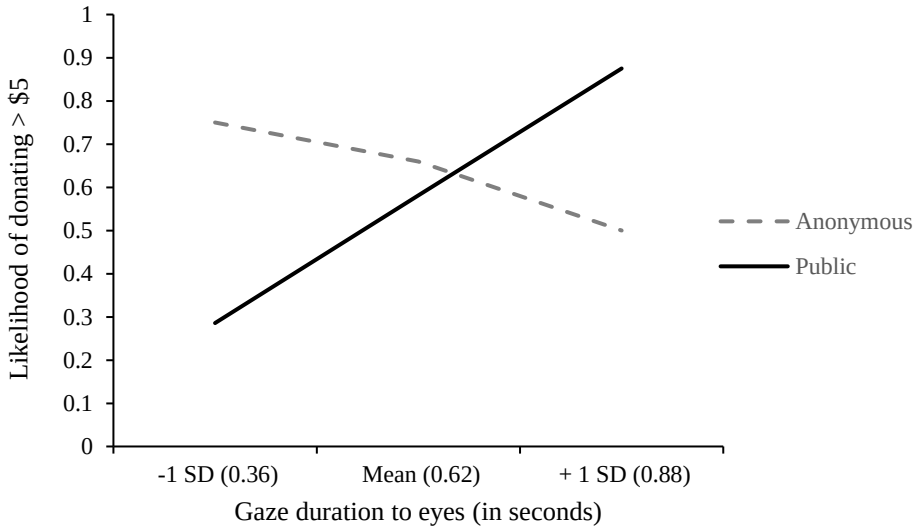

Figure 2. Interaction between gaze duration to eyes and condition predicting likelihood of donating $6-10. For the public condition, gaze duration to eyes significantly predicted donation behavior. However, in the anonymous condition, gaze duration to eyes was not a significant predictor.

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Data availability

The data associated with this research are available at

http://dx.doi.org/10.17632/vvhw3rky3y.1

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References

Andreoni, J., & Petrie, R. (2004). Public goods experiments without confidentiality: A glimpse into fund-raising. *Journal of Public Economics, 88,* 1605-1623. doi: 10.1016/S0047-2727(03)00040-9

Barclay, P. (2004). Trustworthiness and competitive altruism can also solve the "tragedy of the commons". *Evolution and Human Behavior, 25,* 209-220. doi: 10.1016/j.evolhumbehav.2004.04.002

Bateson, M., Callow, L., Holmes, J. R., Redmond Roche, M. L., & Nettle, D. (2013). Do images of 'watching eyes' induce behaviour that is more pro-social or more normative? A field experiment on littering. *PLoS One, 8,* e82055. doi: 10.1371/journal.pone.0082055

Bateson, M., Nettle, D., & Roberts, G. (2006). Cues of being watched enhance cooperation in a real-world setting. *Biology Letters, 2,* 412-414. doi: 10.1098/rsbl.2006.0509

Bull, R., & Gibson-Robinson, E. (1981). The influences of eye-gaze, style of dress and locality on the amounts of money donated to a charity. *Human Relations, 34,* 895-905. doi: 10.1177/001872678103401005

Burnham, T. C., & Hare, B. (2007). Engineering human cooperation: Does involuntary neural activation increase public goods contributions? *Human Nature, 18,* 88-108. doi: 10.1007/s12110-007-9012-2

Carbon, C. C., & Hesslinger, V. M. (2011). Bateson et al.'s (2006) cues-of-being-watched paradigm revisited. *Swiss Journal of Psychology, 70,* 203-210. doi: 10.1024/1421-0185/a000058

Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics, 15*, 530-546. doi: 10.1007/s10683-011-9312-6

Engelmann, J. M., Herrmann, E., & Tomasello, M. (2012). Five-year-olds, but not chimpanzees, attempt to manage their reputations. *PLoS One, 7*:e48433.

Ernest-Jones, M., Nettle, D., & Bateson, M. (2011). Effects of eye images on everyday cooperative behavior: A field experiment. *Evolution and Human Behavior, 32*, 172-178. doi: 10.1016/j.evolhumbehav.2010.10.006

Fehr, E., & Gächter S. (2002). Altruistic punishment in humans. *Nature, 415*, 137-140. doi: 10.1038/415137a

Fehr, E., & Schneider, F. (2010). Eyes are on us, but nobody cares: Are eye cues relevant for strong reciprocity? *Proceedings of the Royal Society B: Biological Sciences, 277*, 1315-1323. doi: 10.1098/rspb.2009.1900

Grossmann, T. (2017). The eyes as windows into other minds: An integrative perspective. *Perspectives on Psychological Science, 12*, 107-121. doi: 10.1177/1745691616654457

Haley, K. J., & Fessler, D. M. T. (2005). Nobody's watching? Subtle cues affect generosity in an anonymous economic game. *Evolution and Human Behavior, 26*, 245-256. doi: 10.1016/j.evolhumbehav.2005.01.002

Jolij, J., & de Haan, T. Failure to replicate increasing generosity by eyes. (2014, July 28). Retrieved 13:57, November 20, 2016 from http://www.PsychFileDrawer.org/replication.php?attempt=MTk4

Kampe, K. K. W., Frith, C. D., & Frith, U. (2003). "Hey John": Signals conveying communicative intention toward the self activate brain regions associated with "mentalizing," regardless of modality. *Journal of Neuroscience, 23*, 5258-5263.

Kano, F., & Tomonaga, M. (2010). Face scanning in chimpanzees and humans: Continuity and discontinuity. *Animal Behaviour, 79*, 227–235. doi: 10.1016/j.anbehav.20 09.11.0 03

Kim, M.-S., & Sharkey, W. F. (1995). Independent and interdependent construals of self: Explaining cultural patterns of interpersonal communication in multi-cultural organizational settings. *Communication Quarterly, 43*, 20-38.

Kurzban, R. (2001). The social psychophysics of cooperation: Nonverbal communication in a public goods game. *Journal of Nonverbal Behavior, 25*, 241-259. doi: 10.1023/A:1012563421824

Lamba, S., & Mace, R. (2010). People recognize when they are really anonyous in an economic game. *Evolution and Human Behavior, 31,* 271-278. doi: 10.1016/j.evolhumbehav.2010.02.002

Leys, C., Ley, C., Klein, O., Bernard, P., & Licata, L. (2013). Detecting outliers: Do not use standard deviation around the mean, use absolute deviation around the median. *Journal of Experimental Social Psychology, 49*, 764-766. doi: 10.1016/j.jesp.2013.03.013

Manesi, Z., Van Lange, P. A. M., & Pollet, T. V. (2016). Eyes wide open: Only eyes that pay attention promote prosocial behavior. *Evolutionary Psychology, 14*, 1-15. doi: 10.1177/1474704916640780

Mifune, N., Hashimoto, H., & Yamagishi, T. (2010). Altruism toward in-group members as a reputation mechanism. *Evolution and Human Behavior, 31,* 109-117. doi: 10.1016/j.evolhumbehav.2009.09.004

Milinski, M., Semmann, D., & Krambeck, H.J. (2002). Reputation helps solve the 'tragedy of the commons'. *Nature, 415,* 424-426. doi: 10.1038/415424a

Nettle, D., Harper, Z., Kidson, A., Stone, R., Penton-Voak, I. S., & Bateson, M. (2013). The watching eyes effect in the Dictator Game: It's not how much you give, it's being seen to give something. *Evolution and Human Behavior, 34,* 35-40. doi: 10.1016/j.evolhumbehav.2012.08.004

Nettle, D., Nott, K., & Bateson, M. (2012). 'Cycle thieves, we are watching you': Impact of a simple signage intervention against bicycle theft. *PLoS One, 7,* e51738. doi: 10.1371/journal.pone.0051738

Northover, S. B., Pederson, W. C., Cohen, A. B., & Andrews, P. W. (2017). Artificial surveillance cues do not increase generosity: Two meta-analyses. *Evolution and Human Behavior, 38,* 144-153. doi: 10.1016/j.evolhumbehav.2016.07.001

Oda, R., Niwa, Y., Honma, A., & Hiraishi, K. (2011). An eye-like painting enhances the expectation of a good reputation. *Evolution and Human Behavior, 32,* 166-171. doi: 10.1016/j.evolhumbehav.2010.11.002

Panagopoulos, C. (2014a). I've got my eyes on you: Implicit social pressure cues and prosocial behavior. *Political Psychology, 35,* 23-33. doi: 10.1111/pops.12074

Panagopoulos, C. (2014b). Watchful eyes: Implicit observability cues and voting. *Evolution and Human Behavior, 35,* 279-284. doi: 10.1016/j.evolhumbehav.2014.02.008

Pfattheicher, S., & Keller, J. (2015). The watching eyes phenomenon: The role of a sense of being seen and public self-awareness. *European Journal of Social Psychology, 45*, 560-566. doi: 10.1002/ejsp.2122

Piazza, J., Bering, J.M., & Ingram, G. (2011). "Princess Alice is watching you": Children's belief in an invisible person inhibits cheating. *Journal of Experimental Child Psychology, 109*, 311-320. doi: 10.1016/j.jecp.2011.02.003

Powell, K. L., Roberts, G., & Nettle, D. (2012). Eye images increase charitable donations: Evidence from an opportunistic field experiment in a supermarket. *Ethology, 118*, 1096-1101. doi: 10.1111/eth.12011

Reinstein, D., & Riener, G. (2012). Decomposing desert and tangibility effects in a charitable giving experiment. *Experimental Economics, 15*, 229-240. doi: 10.1007/s10683-011-9298-0

Saunders, T. J., Taylor, A. H., & Atkinson, Q. D. (2016). No evidence that a range of artificial monitoring cues influence online donations to charity in an MTurk sample. *Royal Society Open Science, 3*, 150710. doi: 10.1098/rsos.150710

Singelis, T. M., & Sharkey, W. F. (1995). Culture, self-construal, and embarrassability. *Cross-Cultural Psychology, 26*, 622-644. doi: 10.1177/002202219502600607

Sparks, A., & Barclay, P. (2013). Eye images increase generosity, but not for long: The limited effect of a false cue. *Evolution and Human Behavior, 34*, 317-322. doi: 10.1016/j.evolhumbehav.2013.05.001

Sparks, A., & Barclay, P. (2015). No effect on condemnation of short or long exposure to eye images. *Letters on Evolutionary Behavioral Science, 6*, 13-16. doi: 10.5178/lebs.2015.35

Tomasello, M., Hare, B., Lehmann, H., & Call, J. (2007). Reliance on head versus eyes in the gaze following of great apes and human infants: The cooperative eye hypothesis. *Journal of Human Evolution, 52*, 314-320. doi: 10.1016/j.jhevol.2006.10.001

[dataset] Vaish, A., Kelsey, C., Tripathi, A., and Grossmann, T., Attentiveness to eyes predicts generosity in a reputation-relevant context, Mendeley Data, v1, 2017, http://dx.doi.org/10.17632/vvhw3rky3y.1

Wedekind, C., & Milinski, M. (2000). Cooperation through image scoring in humans. *Science, 288*, 850-852. doi: 10.1126/science.288.5467.850