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Unexpected events as a cue to social surveillance

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Abstract

Social surveillance and supernatural watchers have both been shown to increase prosocial behaviour, but previous research has not investigated the full range of cues that can imply the presence of a watching mind (natural or supernatural). This study investigated unexpected behaviour as a cue to the presence of a watching mind. 120 undergraduates (mean age = 21 years, 81 women) completed the Marlow-Crowne Social Desirability Questionnaire and a modified Dictator Game on a computer that either worked properly, occasionally malfunctioned (flickered to reveal the desktop), or malfunctioned to reveal eye-like images. No differences in social desirability responding or dictator game giving were found for a malfunctioning computer, compared to a non-malfunctioning computer, suggesting that the unexpected computer malfunction did not cue social surveillance in this experiment.

Unexpected events as a cue to social surveillance

Ever since Plato's discussion of the mythical Ring of Gyges, philosophers, political scientists, and social scientists have theorized that being observed by others prevents people from transgressing moral norms. People are recorded by security cameras in stores and are watched by the police on the highway in order to catch and punish transgressors, but people are also reminded that they are being watched, in an effort to deter stealing or speeding in the first place. The consequences of being caught committing a moral transgression can involve explicit punishment, but may also include reproof, gossip, ostracism, and other lost benefits of cooperation. People can benefit from moral transgressions when they are not identified and caught, such as gaining resources at no cost to themselves through theft, but they would suffer if other people witnessed their actions. People are therefore highly sensitive to cues that another person is watching, and they often change their behaviour accordingly. Even false cues, like images of eyes that are not attached to an actual human being, can influence people's behaviour. Eye-like designs on a computer desktop (Haley & Fessler, 2005), or above an honesty box in a coffee room (Bateson, Nettle, & Roberts, 2006), can lead people to donate more money than when eye-related stimuli are absent. Similarly, ambient darkness or wearing dark glasses provides (false) environmental cues that other people cannot see the participants, which can increase their dishonest and selfish tendencies (Zhong, Bohns, & Gino, 2010). Some researchers have also proposed that religious beliefs may facilitate cooperation by providing a supernatural watcher who is *always* observing people's behaviour and is able to punish cheating and other transgressions (Bering, 2011; Johnson, 2005; Norenzayan, 2013; for a review see Schloss & Murray, 2011). We do not yet know the full range of cues that lead people to perceive the presence of a watching agent (natural or supernatural) and the consequences this can have. The

current study examined how social cues unrelated to seeing a human face can promote prosocial behaviour.

Social and Supernatural Surveillance

Human beings are extremely sensitive to cues that another person is present. Seeing faces and agency in natural phenomena can subconsciously influence people's behaviour, even when no agent is actually present. Several studies have shown that surreptitious images of eyes, or eye-like designs, in an experimental setting lead to increased prosocial behaviour. In the absence of any actual people, experiments have shown that eye-spots increased the amount of money altruistically given to a stranger (Haley & Fessler, 2005; Oda, Niva, Hanma, & Hiraishi, 2011; Sparks & Barclay, 2013), increased the contribution to a public goods game (Burnham & Hare, 2007), and increased condemnation of moral behaviours (Bourrat, Baumard, &McKay, 2011). In naturalistic settings, images of eyes have decreased the amount of littering (Bateson, Callow, Holmes, Redmond Roche, & Nettle, 2013), increased the amount of money given for communal coffee (Bateson et al., 2006), and increased charitable giving in a supermarket (Powell, Roberts, & Nettle, 2012). These studies suggest that people's behaviour becomes more prosocial when cues imply that other people are watching.

The majority of studies that have been conducted on this topic have thoroughly investigated the influence that eyes have on prosocial behaviour, but there are many other cues that could suggest the presence of a human-like mind that is aware of a person's behaviour. Evidence suggests that the belief in the watching mind of a supernatural being can influence how people act, even when no watching eyes are visible. For example, Bering, McLeod, and Shackelford (2005) gave participants a difficult visual-spatial task in which they could cheat by failing to press the space bar on the computer. They found that participants were quicker to press

the space bar when they were told that the ghost of a dead graduate student had recently been seen in the lab. With children, being told that an invisible person, "Princess Alice," was present led children to cheat less on a game, compared to when they were left alone, a similar decrease in cheating to when the children were being observed by an adult (Piazza, Bering, & Ingram, 2011).

Reminders of God also increase prosocial behaviour in comparable ways to reminders of other people. In the same way that images of eye-spots increase prosocial behaviour, belief in a punitive god (Shariff & Norenzayan, 2011) and priming religious concepts is associated with increased honesty (Aveyard, 2014; Randolph-Seng & Nielsen, 2007), and increased cooperation (Ahmed & Salas, 2011; Rand, Dreber, Haque, Kane, Nowak, & Coakley, 2014). For example, priming participants with religious words (e.g., spirit, God) or secular justice words (e.g., court, police) led to similar increases in donations in the Dictator Game (where participants are given the control over the distribution of finite resources), compared to unprimed participants (Shariff & Norenzayan, 2007). These studies have led researchers to propose that one way that religions encourage moral behaviour is through the belief in watching, moralizing gods (Bering, 2011; Johnson, 2005; Norenzayan, 2013; Schloss & Murray, 2011). According to the *supernatural monitoring hypothesis*, "the cognitive awareness of gods is likely to heighten prosocial reputational concerns among believers, just as the cognitive awareness of human watchers does among believers and non-believers alike" (Norenzayan & Shariff, 2008, p. 58). Therefore, people who are reminded of the watching mind of a god or a ghost become more prosocial in the same way as when they are observed by other human beings, because of a desire to maintain a reputation for prosocial behaviour.

Cues to Mind Perception

Unlike humans, supernatural beings do not have actual eyes that can be seen watching participants in these studies (Ahmed & Salas, 2011; Aveyard, 2014; Shariff & Norenzayan, 2011). This makes it unclear which stimuli lead people to infer the presence of supernatural watchers, given that evidence suggests that religious thoughts need to be activated by something (see Norenzayan, Henrich, & Singerland, 2013). While eyes can serve as a cue of a watcher, the important aspect of social surveillance is not the eyes, but the *mind* for which the eyes provide evidence. Minds can be associated with a visible human body, face, and eyes, but evidence suggests that there are many other cues that suggest the presence of a living being with a mind. Mind perception is not an all-or-nothing phenomena that occurs when one human being meets another. Mind perception can occur in gradations (Tomasello, 1999) ranging from merely distinguishing animate agents from inanimate objects (e.g., an animal vs. a rock formation), to seeing an agent as engaging in intentional, goal-directed movement (e.g., the animal is trying to get food), to seeing an agent who holds conscious beliefs and awareness about the world around them (e.g., the animal believes that I know where the food is). Minds are often misapplied to a wide range of entities, such as a failure to perceive other human beings as possessing uniquely human mental abilities (Haslam, 2006) or attributing human mental abilities to animals, machines, and gods (Epley, Waytz, & Cacioppo, 2007). Studies in cognitive development have demonstrated that even the movement of simple geometric shapes can lead to the perception of self-initiated, goal-directed movement of an intentional agent (Gelman et al., 1995; Scholl & Tremoulet, 2000). Socially-contingent reactions can also lead infants to perceive a robot as an agent, even in the absence of a face (Johnson et al., 1998). Therefore, there should be cues other

than eyes that facilitate prosocial behaviour, because they lead people to infer the presence of a watching agent.

Unexpected behaviour is another feature that can lead people to perceive the presence of mindful entities. Unexpected behaviours and unexpected occurrences make people more likely to perceive agency and a mind in order to understand and explain strange phenomena (Epley et al., 2007). This may reflect an evolutionarily-ancient tendency in cognition to over-perceive minds when stimuli are ambiguous or uncertain. For example, unexpected movements or irregular changes in the environment can lead to the perception of a dangerous animal or ancestral spirits lurking in the bushes (Barrett, 2000; Guthrie, 1993). By attributing a mind to sources of unexpected behaviour, people may feel better able to predict how it will behave, regardless of the accuracy of this feeling (Waytz, Morewedge, Epley, Monteleone, Gao, & Cacioppo, 2010).

Machines are an interesting example, because they have the ability to perform self-controlled actions, which makes them seem more agentic than most inanimate objects, but they cannot make goal-consistent changes to their behaviour in the same way that an intelligent agent would (Gelman, Durgin, & Kaufman, 1995). Machines seem more inanimate as they perform regular, expected actions, but seem more animate and mindful as the machines act erratically or unexpectedly alter their behaviour. Consistent with this prediction, Waytz, Morewedge et al. (2010) found the more that participants reported that their computer malfunctioned, the more they attributed a mind, beliefs, and desires to their computer.

The Present Study

The current study used unexpected computer malfunctions during a computer-based task to evoke the feeling that the computer has a mind that is aware of participant's responses, in the

same way that eye-images evoke the sense of social surveillance. Supernatural beings can also communicate their intentions through unexpected events. For example, Bering and Parker (2006) found that older children, who were told that the invisible Princess Alice would let them know which box to choose, interpreted a flickering light or a falling picture as a sign from her. While the computer malfunction used in this study was not associated with any supernatural agents, unexpected behaviour by technological machines, or by supposed supernatural beings, both evoke the sense of a mind through the same mechanisms of anthropomorphism (Waytz, Morewedge, et al., 2010).

One effect of social surveillance is increased scores on social desirability measures, which assess whether people have described themselves in an unrealistically-positive way. Perceiving a watching mind should lead to decreased feelings of anonymity, and several studies have shown that decreased anonymity tends to increase socially desirable responses (Becker, 1976; Dodou & de Winter, 2014; Joinson, 1999; Richman, Kiesler, Weisband, & Drasgow, 1999). Similarly, participants who were asked questions in a face-to-face interview (Waterton & Duffy, 1984) or by an anthropomorphic-looking computer display (Sproull, Subramani, Kiesler, Walker, & Waters, 1996; Waytz, Cacioppo, & Epley, 2010) showed increased social desirability responding compared to when the questions were asked through written text. Social desirability responding has also been found to be positively associated with religiosity (Sedikides & Gebauer, 2010). Gervais and Norenzayan (2012) found that priming people with the idea of God or the thought of other people led to increased situational self-awareness compared to un-primed participants, and priming religious believers with thoughts of God led to increased social desirability responding. These results suggest that making participants aware of a watching mind—whether through other people in the experiment, the computerized face, or an omniscient deity—leads them to report

more socially-desirable characteristics. Therefore, social desirability responding should increase when the computer malfunction makes participants perceive the computer to have a mind (Hypothesis 1).

Social desirability responding provides evidence that unexpected behaviour cues social surveillance, but this is not itself a measure of prosocial behaviour. The Dictator Game is frequently used in psychological studies as a lab-based measure of altruistic behaviour. In this task, there is no explicit incentive to give money or other resources away, as participants cannot be punished or otherwise sanctioned for keeping more money for themselves. Despite this, many people in this activity still give some money away. The amount of money given away in the Dictator Game is increased by social surveillance in the same manner that social desirability is increased. Participants who believed that other people knew and would gossip about their allocations gave away more money than did participants whose allocations were anonymous (Piazza & Bering, 2008). Several studies demonstrated that the presence of eye-spots increased giving in this task (e.g., Haley & Fessler, 2005; Mifune, Hashimoto, & Yamagishi, 2010; Oda, Niva, Hanma, & Hiraishi, 2011; Rigdon, Ishii, Watabe & Kitayama, 2009; Sparks & Barclay, 2013). Religious primes can also increase giving in the Dictator Game (Ahmed & Salas, 2011; Harrell, 2012; Shariff & Norenzayan, 2007), potentially because religious words remind people of being watched by supernatural beings (Norenzayan, 2013). These previous studies suggest that participants who perceive a malfunctioning computer to have a mind should allocate more resources in the Dictator Game than do participants whose computer does not malfunction (Hypothesis 2).

This study assessed the impact of social surveillance cues on prosocial behaviour by having participants complete the Marlowe-Crowne Social Desirability questionnaire (Reynolds, 1982)

and a modified Dictator Game on a computer that elicited various cues of having a mind. Participants used a computer that either did not malfunction, malfunctioned by flickering to reveal the desktop, or malfunctioned by flickering to reveal the desktop with an eye-like design. It was hypothesized that the unexpected action of the computer screen flicker would cue social surveillance and increase social desirability responding and Dictator Game allocations, with or without visible eye designs. This would lend support to the position that implied social surveillance can facilitate prosocial behaviour even in the absence of real people, and provide evidence of a cue other than eye-spots that has this effect.

Method

Participants

Participants were 120 undergraduate students (81 women, aged 17 – 56 years, $M = 21.15$, $SD = 5.94$). Participants recruited through the Psych 1000 participant pool and a second-year cognitive psychology class received partial course credit (up to 2.5%) for completing a related assignment, while participants recruited from flyers posted on campus received $10 for their participation. They also took home the amount of chocolate they had allocated to themselves during the Dictator Game.

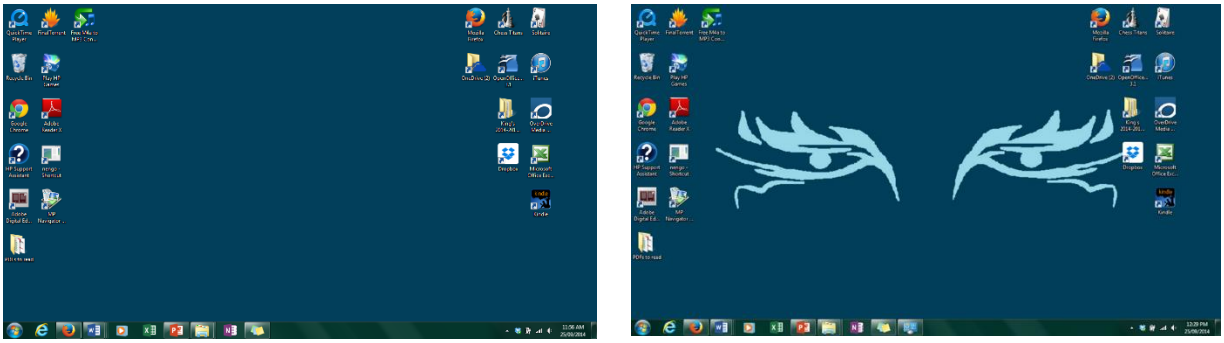
Materials

Social Desirability Questionnaire. People's willingness to describe themselves in a positive way was measured using the 12-item version of the Marlowe-Crowne Social Desirability Questionnaire (Reynolds, 1982), which showed acceptable reliability (Cronbach's $\alpha = .68$). On this questionnaire, participants described whether various socially-desirable attributes apply to themselves, using a true/false response. This includes statements that are common but socially undesirable, such as "It is sometimes hard for me to go on with my work if I am not

encouraged," or unrealistically positive statements, such as "I have never been irked when people expressed ideas very different from my own." Participants' responses are scored such that each response in the socially-desirable direction is given one point and the points are added, with higher scores representing more socially-desirable responding.

Dictator Game. Participants took part in the Dictator Game, an activity where individuals are given a finite amount of some resource (usually money), which they can keep or redistribute a portion of to someone else (Forsythe, Horowitz, Savin, & Sefton, 1994). The Dictator Game was modified to use chocolate instead of money (see Appendix A). Participants were instructed to take up to four small chocolates (various Halloween-sized chocolate bars) for themselves from a bowl on the table, knowing that the remainder of the four would be given to another anonymous participant in the study. Chocolates were visible during the entire study, in a large bowl containing 30 small chocolates that the participants could choose from during this task. The number of chocolates the participants took for themselves provided a measure of prosocial behaviour.

Unexpected computer malfunction. To manipulate the presence of social cues, some participants experienced a "computer malfunction," where the computer screen displaying the questionnaires occasionally flickered to reveal the computer's desktop. Some participants saw the screen flicker to a blank desktop (Figure 1a), while others saw the screen flicker to a desktop with stylized eye images (Figure 1b). A control group of participants did not see the screen flicker at all. The screen flickered to reveal the desktop for 500 ms during questions one, three, seven, and nine of the Social Desirability Questionnaire.



a. b.

Figure 1. Image of the computer desktop revealed during the "computer malfunction." (a) Desktop without eye-images. (b) Desktop with eye images.

Mind of the computer. A six-item scale was developed to assess the extent to which the computer possessed various aspects of a mind: being inanimate (reverse scored), being alive, and having goals, intentions, a mind of its own, and conscious awareness (see Appendix B). Participants rated the computer that they had used to complete the study on a Likert scale ranging from 1 (*not at all*) to 7 (*very much*). This questionnaire had acceptable reliability (Cronbach's $\alpha = .80$), and the scores on this questionnaire were averaged, with higher scores indicating that participants saw the computer as having more of a mind. Participants also reported how frustrated the computer made them feel, on a 7-point Likert scale.

Procedure

Participants were recruited online through the SONA system or by responding to a poster advertisement, and came to the psychology laboratory to complete the study, which took less than 30 minutes to complete. After providing informed consent, participants were seated at a desktop computer in a psychology lab, and were left alone in the room to complete the study. Participants provided demographic information (i.e., age and gender), then completed the Social Desirability Questionnaire, followed by the modified Dictator Game, dividing chocolates between themselves and another participant. Participants were randomly assigned to experience either a computer malfunction, computer malfunction with eye-images, or no malfunction. The malfunction occurred as a screen flicker, to reveal the computer's desktop, during the Social Desirability Questionnaire. Finally, participants answered a series of questions about the computer to assess the degree to which the computer seemed to have a mind, were thanked and debriefed.

Results

Mind of the computer. Participant's perception that a malfunctioning computer had more of a mind was analysed using a one-way between-subjects ANOVA based on experimental condition (control, malfunction without eyes, malfunction with eyes). The degree of a mind perceived in the computer when malfunctioning (with eyes $M = 2.11$, $SD = 1.11$, without eyes $M = 2.57$, $SD = 1.11$) did not significantly differ from that of a non-malfunctioning computer ($M = 2.25$, $SD = 1.27$), $F\ (2, 117) = 1.63$, $p = .20$, *ns*, partial $\eta^2 = .03$.

Frustration. Participants were significantly more frustrated by the computer when it malfunctioned (with eyes $M = 3.43$, $SD = 1.89$, without eyes $M = 3.66$, $SD = 1.76$), than when it did not malfunction ($M = 2.28$, $SD = 1.40$), $F\ (2, 117) = 7.57$, $p = .001$, partial $\eta^2 = .12$.

Social Desirability. Participants' socially-desirable self-descriptions depending on experimental condition were analysed using a one-way between-subjects ANOVA. Participants' socially-desirable responding did not differ from a non-malfunctioning computer ($M = 5.30$, $SD = 3.07$) when the computer malfunctioned with or without eye-images ($M = 4.64$, $SD = 2.27$, and $M = 5.03$, $SD = 2.66$, respectively), $F\ (2, 117) = .62$, $p = .53$, *ns*, partial $\eta^2 = .01$ (see Figure 2). Socially-desirable responses were also uncorrelated with experimental condition and perception that the computer had a mind.

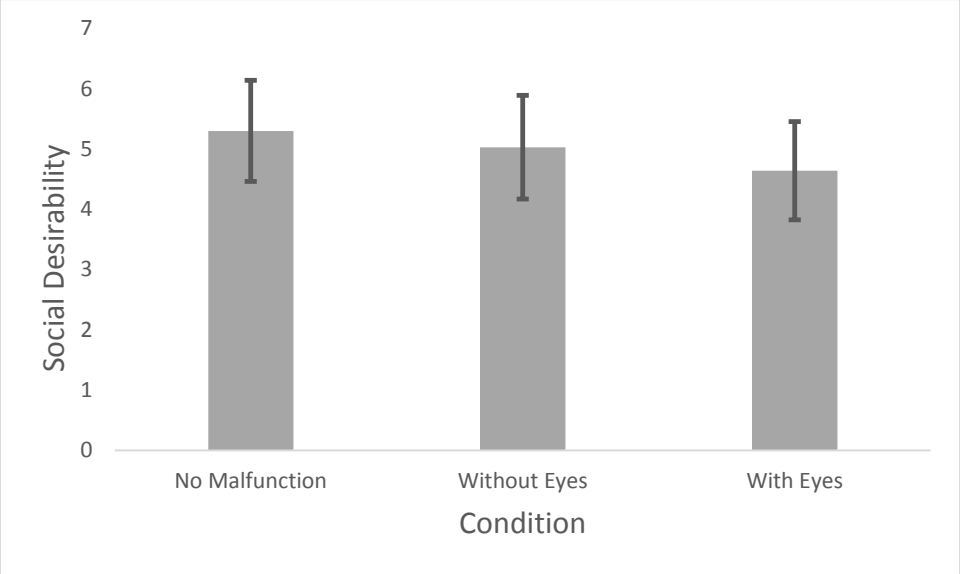


Figure 2. Social desirability responding among participants who responded on a non-malfunctioning computer, or a malfunctioning computer with or without eye-images. Error bars represent 95% confidence intervals.

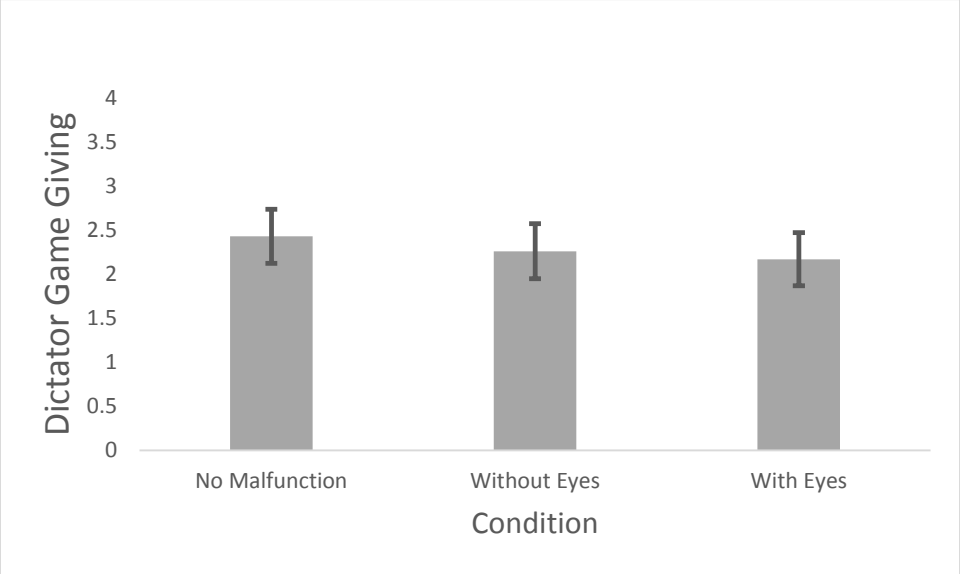


Figure 3. Dictator Game giving among participants who responded on a non-malfunctioning computer, or a malfunctioning computer with or without eye-images. Error bars represent 95% confidence intervals.

Dictator Game. Participant giving rates in the modified Dictator Game depending on experimental condition were analysed using a one-way between-subjects ANOVA. Participants were no more likely to give away chocolate to another person when the computer malfunctioned (with eyes $M = 2.17$, $SD = 0.96$, without eyes $M = 2.26$, $SD = 1.11$) than when the computer did not malfunction ($M = 2.43$, $SD = .87$), F (2, 117) = .72, $p = .489$, *ns*, partial $\eta^2 = .01$ (see Figure 3). However, bivariate correlations showed that participants who viewed the computer as having more of a mind tended to give less chocolate to another participant, $r = -.19$, $p = .032$.

Discussion

This study examined whether the unexpected behaviour of an inanimate object, manipulated through a computer malfunction, could act as a cue for social surveillance. The unexpected computer malfunction did not cause participants to explicitly describe the computer as having more of a mind than did a non-malfunctioning computer. The computer also failed to act implicitly as a cue to a watching mind, because participants who experienced a computer malfunction did not give more socially-desirable responses or give away more resources in a modified Dictator Game, both tasks that can be influenced by the presence of watching people (e.g., Sproull et al., 1996; Piazza & Bering, 2008). This manipulation only succeeded in making people more frustrated, although this frustration did not have a noticeable effect on social desirability or Dictator Game allocations. In the present study, the computer malfunction may have failed to act as a social cue because participants were university students, who regularly use computers and are familiar with computer malfunctions. This familiarity may have prevented participants from spontaneously attributing a mind to the computer (as suggested by Waytz, Morewedge, et al., 2010), but to attribute the malfunction to the quality of computers in general. A more extreme or unusual unexpected event (e.g., unexpected behaviour by technology that

usually does not malfunction, such as flickering lights), may be required to activate the hyperactive agency detection proposed by some researchers (Barrett, 2000; Guthrie, 1993), and could be examined in future research.

The present study also did not show an effect of eye-like images as a cue to social surveillance. The computer malfunction on its own was insufficient to affect people's responses in the Social Desirability Questionnaire or the Dictator Game, and participants were also unaffected by seeing eye-like images during the malfunction, despite eye-like images effectively acting as a social cue in similar tasks in previous studies (Haley & Fessler, 2005; Oda, Niva, Hanma, & Hiraishi, 2011; Sparks & Barclay, 2013). The presence of eye-images may have failed to affect participant's behaviour in this condition, in part, because the effect of eyes is weak or inconsistent (e.g., Sparks & Barclay, 2013), but also because the measures used in this study were not sensitive enough to detect any effect. For example, instead of allocating money as is usually done in the Dictator Game, participants in this study allocated chocolates to themselves and another person. These chocolates may not have been desirable enough to participants, and the number of chocolates may have been so limited (i.e., zero to four) that there was not enough variation in participant's responses to detect any change in prosocial tendencies caused by the manipulation. A large proportion of participants (between 54% and 64%, depending on experimental condition) simply split the chocolates in half between themselves and the other person. Therefore, the effect of subtle social cues (whether eyes or unexpected behaviour) may be slight, and require more sensitive tasks to be measured.

It is also possible that people are not always influenced by the presence of subtle social cues, but only show changes in their behaviour when their beliefs about the world allow them to attribute these cues to the presence of a watching agent. For example, Bering and Parker (2006)

examined children's interpretation of an unexpected event (e.g., a flickering light, a falling picture) to imply the presence of a watching supernatural being (Princess Alice). These events were only attributed to Princess Alice when the children were told about her; they did not spontaneously attribute unexpected events to a supernatural agent. Similarly, the effect of religious primes on a person's behaviour is only consistent among people who are somewhat religious, not among people who do not hold any religious beliefs (Shariff, Willard, Andersen, & Norenzayan, in press), indicating that people's explicit beliefs about the world affect whether subtle situational cues will affect their behaviour.

This perspective has implications for by-product theories of religion, which posit that people's belief in supernatural agents is merely a side-effect of their ability to see minds in other humans (Barrett, 2000; Guthrie, 1993). Vicarious mind perception may not be an inevitable consequence of our ability to see minds where they actually exist, but rather an ability that has been co-opted by cultural systems to give rise to religious beliefs. People who believe in supernatural minds do not necessarily have greater mind perception abilities in general (Willard & Norenzayan, 2013). Instead, mind perception abilities may be necessary, but not sufficient, to have a belief in supernatural minds. Only when these mind perception abilities are linked to a cultural system that promotes belief in supernatural beings, or when people have other attributes that prevent them from distinguishing between real and imagined minds (e.g., ontological confusion, Lindeman, Svedholm-Häkkinen, Lipsanen, 2015), will people see unexpected occurrences as subtle social cues that indicate the presence of watching agents. Therefore, although the present study failed to find any effect of an unexpected computer malfunction as a cue to social surveillance, unexpected events could be further examined as a cue to the presence of supernatural watchers among people whose worldview involves such beings. Unexpected

events may not automatically activate the perception of an intelligent agent, but they may serve as a cue to the presence of a watching mind when other attributions fail, unlike in the present study that involved an unexpected computer malfunction as a cue to social surveillance.

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Appendix A

Modified Dictator Game Instructions

At the end of this experiment, you will be given up to 4 chocolates that you can take home with you. You have also been paired with another participant in this experiment. You can divide these 4 chocolates between yourself and this other participant in any way that you choose. You can choose to keep all of the chocolates for yourself, or you can give some of them to this participant. You will not know who this person is and you will remain completely anonymous to them. Please write in the box below how many of the 4 chocolates you want to take home yourself. The rest of the chocolates will be given to another participant.

Appendix B

Mind of the Computer Questionnaire

Answer the following questions about the computer you are using to complete this study:

1. To what extent is the computer inanimate?
2. To what extent is the computer alive?
3. To what extent does the computer have goals?
4. To what extent does the computer have intentions?
5. To what extent does the computer have a mind of its own?
6. To what extent does the computer have conscious awareness?