



# The Effect of Eyes on Altruistic Tendencies

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## **The Effect of Eyes on Altruistic Tendencies by Jan Julius Beaumont**

### **Abstract**

The purpose of this study is to better understand the driving factors behind the watching eye effect and establish the viability and reliability of this effect in altering human behavior to enhance cooperation. Enhancing the knowledge on successful one-shot game interaction in game theory. Two tests were performed to measure this effect. Experiment one tests different characteristics of eyes found in google doodles and whether they have an effect on search term frequencies in google. Search terms are used as a proxy for behavior and can fall within 3 spectrums prosocial, neutral, and antisocial. Experiment two is a survey that will relax the assumption from the previous test that eyes affect completely autonomous thought. In this experiment eyes along with various control variables are tested if they have influence on altruistic and punishing tendencies. The results from the tests vary, experiment one resulted in many significant predictors but do not all behave according to the predicted pattern based on previous research. Experiment two contradict these results by finding no significant predictive power from eyes in any case. A key take away point found in this study is that characteristics in eyes play a role in determining whether the stimulus is effective. Another being that in order to correctly assess the viability and reliability of the watching eye effect one needs to control for external stimulus, characteristics of the participants, and finally the characteristics of the eyes.

Keywords: Watching eye effect, google doodles, game theory, altruism, punishment, effective predictors

### **Resumo**

O propósito deste estudo é a melhor compreensão dos factores por detrás do efeito “watching eye” e estabelecer a viabilidade deste efeito na alteração do comportamento humano, no sentido de melhorar a cooperação ao melhorar o conhecimento num jogo de uma só repetição na teoria dos jogos. Dois testes foram realizados para medir este efeito. A primeira experiência testa as diferentes características dos olhos encontrados nos “google doodles” e se estes têm um efeito na frequência de certos termos de pesquisa no google. Estes termos de pesquisa são utilizados como um modelo de comportamento que poderá ser considerado como pro-social, neutro ou anti social. A segunda experiência consiste num questionário que não assume aquilo que consideramos anteriormente, isto é, que a presença de olhos afeta completamente o pensamento autónomo. Nesta experiência, os olhos, assim como diversas outras variáveis de controlo, são testadas para saber se influenciam tendências altruístas ou punitivas. Os resultados destes testes variam. No primeiro, foram observados diversos predicadores significantes, no entanto, nem todos agem de acordo com o padrão registado em diversos estudos anteriores. No segundo caso, o teste rejeita os resultados obtidos anteriormente, não registando qualquer significância na presença de olhos em qualquer caso. Algo importante a anotar, neste estudo, é que as características do olhos desempenham um papel relativo à eficiência do estímulo. Também é necessário levar em consideração que, de modo a analisar de forma eficiente a viabilidade do efeito “watching eye”, é necessário controlar para estímulos externos, características dos participantes e as características dos olhos.

Palavras chave: Efeito “watching eye”, google doodles, teoria dos jogos, altruísmo, punição, predicadores eficientes

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## Introduction

The watching eyes effect is a debated topic in both economics and psychology. The watching eyes effect stipulates that exposure to visual cues alters the behavior of the exposed individual. It is hypothesized that this exposure will stimulate prosocial behavior. The behavioral change is expected to stem from social pressures present in early humanity. During this time tribes were small and therefore interactions such as transactions, favors, and cooperation towards goals were often recurrent and between the same individuals. Because of these smaller groups each individual was expected to behave accordingly, and deviation would lead to a bad reputation or a punishment as severe as death or expulsion from the tribe. From this simple scenario there are two mechanisms evident in facilitating cooperation, reputation, and punishment.

Looking at their within group interactions from an economic standpoint, employing a rudimentary version of game theory, we can also see why cooperation or altruism has become embedded in our DNA. Not allowing for transitions between groups, all within group interactions between individuals were recurrent similar to an infinitely repeated game, only stopped by death. The Folk Theorem therefore suggests that the discount factor leaning close to 1 allows for constant cooperation. One-shot interactions within groups would be uncommon if not non-existent but if you allow for intergroup interactions, one-shot interactions become more prevalent. The existence of cooperative one-shot interactions therefore becomes troubling as game theory would predict constant deviation.

In current society one-shot or finite interactions are apparently common. Game theory, based on the assumptions that individuals are rational and act on their self-interest, predicts that all one-shot interactions should result in both parties deviating, provided that deviation leads to a higher payoff. In practice this is not observed. Even in one shot interactions altruistic tendencies still lead to cooperation between individuals. Game theory fails to predict this occurrence, but there are several factors that could prove to have explanatory power. Studies indicated that factors relating to identification of the counterparty can lead to cooperation or altruism in one-shot games (Fathi et al, 2014). Primary among those identification factors are visual cues, research has shown that a depiction of eyes even schematic like faces can lead to higher levels of altruism and cooperation. One plausible explanation is because it reduces the feeling of anonymity, something most frequent in current society due to disassociated negotiations through the internet. The subconscious feeling of being watched therefore imposes the reputational and

punishment concerns leading the actor to behave more prosocial. This study aims to find evidence of this effect in a natural occurring setting and back it up using theoretical evidence.

Being able to identify the reason for one-shot game cooperation should be considered to be of vast importance as finite games are arguably the majority of interactions. Game theory can also not be considered complete without an explanation for finite game cooperation as observed in so many economic games to be discussed later in the paper. Any first-time interaction between different parties entails trust issues that lead the discount factor to be lower making both parties more likely to deviate. Knowing what enables or stimulates a successful first-time interaction leading to a higher discount factor should therefore be extremely interesting to government, researchers and entrepreneurs alike or any party wishing for a successful cooperation.

However, the prevailing theory is that individuals are only susceptible to this eye stimulus if the goal of the interaction is prosocial. This implies that there needs to be a stigma attached to the goal that an individual thinks it is either beneficial for society or reverse that the result of the action is negative for society and will therefore not engage in such an activity. However, the benefits to an individual can transfer to society if enough individuals receive this benefit. Therefore, it is important to make two distinctive hypotheses regarding the effect of visual stimuli, a weak hypothesis and a strict hypothesis. The combination of the above two factors lead to the four main research questions in this study.

1a: The watching eye effect stimulates prosocial behavior regarding societal issues.

1b: The watching eye effect stimulates prosocial behavior at the individual level if the benefit can transfer to society.

2a: The watching eye effect deters antisocial behavior regarding societal issues.

2b: The watching eye effect deters antisocial behavior at the individual level if the detrimental effect can be transferred to society.

It must be said however that results to the effectiveness of the watching eyes effect have been contradicting and the scope of the effectiveness is limited. The majority of studies have found a positive effect of the watching eyes effect in regards to generosity both in terms of amount given as well as the number of people behaving in the prosocial manner (Bateson et al,

2013). These results have been found in various settings, but it has been established that altering the circumstances can have major implications.

While all laboratory studies provide merit to the watching eye effect, the mere notion that participants are in a study should impose some reputational concerns on the subjects, perhaps leading to an overestimation of the watching eye effect. So, while the positive results of these studies indicate the possibility of a watching eye effect, they cannot attest to an unbiased effect. The only possible solution to eliminate this bias is to find the watching eye effect in a natural setting or field experiment.

Contrary to laboratory studies, field experiments often suffer from exposure to other unwanted stimuli making it hard to distinguish the effect of the stimuli proposed to the unwanted stimuli naturally present. The field experiments conducted thus far, although effective in measuring the watching eye effect, could be improved. All field experiments that found a watching eye effect suffer from the same flaw, stimulus in the form of other real people present in the vicinity who would already induce real reputational concerns. Studies did find that the watching eye effect was affected by the presence of people, since there were conflicting results regarding the effect of people present, a new field experiment that virtually eliminates this exposure could be of significance.

This study will attempt to find whether the watching eyes effect is prevalent in naturally occurring circumstances without interference from real reputational concerns posed by watching individuals. To do this the following elements are necessary i.) mental seclusion, in order to prevent the feeling of being watched by one's surrounding ii.) non-test setting, in order to prevent the subject from feeling watched by the proctors iii.) naturally occurring eyes in a setting where we are able to observe the choices of subjects. One such setting that fits the bill are google doodles, small deviations from the google logo to celebrate a certain event, celebrity's birthday, or other achievement. These doodles often include eyes of various sizes, directions, and organisms (fictional and non-fictional). Google is a widely used search engine that thus provides a setting where we are able to observe search results that can be used as a proxy of people's choices which is a behavior. The eyes are randomly occurring and thus leave the subjects unsuspecting of any observation while also providing a sharp contrast. We will test to see whether the influence of eye images occurring in google doodles has an effect on the search results for words that have either a negative or positive stigma attached to it.

Also, due to the conflicting evidence on the watching eye effect and the extra strain on the primary test due to participants having completely autonomous choice in behavior an additional theoretical approach is appropriate. This theoretical approach will be a survey in which participants are randomly assigned to a questionnaire with or without the presence of eyes. The survey will host questions that forces the participant to choose either a prosocial or antisocial standpoint. Limiting the responses to either positive or negative eliminates complete autonomy. This tests the watching eye effect at the most primitive level and creates the biggest chance to see whether an effect is indeed present.

If these tests provide positive and significant results the implications could be massive. It would indicate that the exposure to visual cues is effective in stimulating individuals to make prosocial choices even in the absence of actual monitoring. As monitoring can be expensive, impossible, or illegal this would serve as a viable cheap alternative in places where monitoring is any of the above. For instance, including eyes in an internet browser address bar could potentially keep people from online pirating. In bathroom stalls where no cameras are allowed, depiction of eyes could prevent unruly and unlawful behavior. In supermarkets, people could be influenced to buy healthy alternatives by potentially imposing eyes at the entrance or on packaging. Imposing eyes on billboards could keep travelers or visitors from littering or behaving improper. Visual cues mainly serve to relay information and watching eyes could potentially be a general relay of information to not behave antisocially. Think of general signs, it tells you how to behave in a certain manner, and many people adhere to these signs. Perhaps this seems to general but think of other visual cues that have already been implemented to alter behavior by inducing underlying thoughts. Graphic images have been introduced on cigarette packages to remind the consumer of the unhealthy act he or she is about to commit. By calling forth the knowledge on the detrimental effects of smoking these pictures moderate the amount of smoke. The watching eye effect could in a similar fashion invoke subconscious thought the behavior this individual is about to commit is either harmful to himself or society. The extent to which the watching eye effect is effective is of course still up for debate, and the application of this medium might have limitations. However, the potential financial benefits from preventing individuals from unhealthy, unlawful, or general antisocial behavior and the byproducts that come with such behavior are vast. Even if it's only applicable in a fraction of the mentioned scenarios it urges the exploration of this medium.

## Literature

The primary assumption of game theory is that individuals are rational and act on their self-interest. Yet several empirical observations have shown a contradiction to both these assumptions. Charity funded operations continue to operate, tipping in restaurants continues without contractual obligations, voting although diminishing in Western European countries (Bhatti & Hansen, 2012) continues to exist while “purely selfish people should not vote” (Edlin et al., 2007, p. 305) as the individual cost of voting is higher than the payoff of one vote. And finally, there is a growth in the market for sustainable products (Loo et al., 2015) despite the general perception of en-masse free riding. Not only are these irrational behaviors observed in real life settings. In the prisoner's dilemma game, there are defects from the Nash equilibrium, even under conditions of strict anonymity and clearly expressed one-shot interactions. Much debate trying to explain these anomalies had led to several different theories.

The goal of the watching eye effect and consequently this paper is to facilitate cooperation. It has however been postulated by early economists that full cooperation is doomed to fail. The primary assumptions of game theory in combination with the eloquent words of Garrett Hardin (1968) in the *Tragedy of Commons* provide a clear reason why,

“natural selection favors the forces of psychological denial. The individual benefits as an individual from his ability to deny the truth even though society as a whole, of which he is a part, suffers” (p. 3).

In layman terms, in public resources such as the ocean, air, and land, the detrimental effect caused by one person are shared by the whole society while the benefits are his alone, therefore his benefits outweigh his cost and he will proceed with his harmful endeavor. Solace can be found in the argument by Hardin (1968) that education can counteract this natural tendency, as well as research by Marwell & Ames (1981) that shows support for only a weak version of the free-rider hypothesis, “the voluntary provision of public good by groups will be suboptimal” (p. 296). The terrifying implications of a strong free-rider hypothesis that, “no public goods at all will be provided through voluntary means” (p. 296), are thus unlikely, but the free-rider hypothesis still stands, full cooperation will thus be unlikely. That said, the growth of the human population leads to less prevalent monitoring by authorities, and while society does keep the free-riding at bay (Carpenter, 2007), potential effective means of monitoring such as the watching eye effect should be considered as a method of further controlling free-riders.

The Savanna Principle is a term coined by evolutionary psychologist Satoshi Kanazawa explaining that certain behavioral traits adapted by the early Homo species of the Savanna are residing and subconsciously dominant in some human behavior. He further claims that discrepancies in Game theory such as cooperation in the prisoner's dilemma can be attributed to this principle. Conceptual differences between historic settings and that of the prisoner's dilemma such as strict anonymity is a vital difference as the human psyche has not adapted to this situation. Individuals participating in the prisoner's dilemma game and opting for cooperation are therefore theorized to be influenced by their subconscious which does not allow the notion of strict anonymity as this is an evolutionary novel setting. The cooperating individual is afraid of the repercussions to her reputation if he defects. The support of the reputational mechanism affecting an individual further supports the watching eye effect as it is a cue that reminds the individual that their reputation is at stake.

Strong reciprocity can be described as costly actions of one individual to punish those breaking cooperative and social norms, or aiding and reciprocating to those who adhere to cooperative norms, even at personal expense (Fong et al. 2004). It can explain many anomalies in economic games that fail to be predicted by game theory. In the dictator and ultimatum game, where there is a principle agent proposing a certain amount of money and the recipient can either deny both of them any money or accept and keep the proposition. The economically rational choice of the proposer would be to give an infinitely small amount as the reward the recipient is receiving is infinitely bigger than zero. Yet, empirical evidence by (Fong et al. 2006) has shown that amounts smaller than 30 percent tend to be rejected. Although the strong reciprocity hypothesis can explain these deviations for the *Homo Economicus*' choice, it cannot account for cooperation in the prisoner's dilemma game without "any assumptions about the evolutionary constraints of the human brain" (Kanazawa & Fontaine, 2013, p. 201). As those who truly understand the prisoner's dilemma game know no reciprocal treatment is reasonably possible and therefore will remain to defect rather than cooperate. This is however not the case, when looking at the n-1 public goods experiment where individuals are able to contribute to public goods at their own expense, the primary contribution is around 40-50% (Isaac et al. 1994) but declines with further rounds, supporting the strong reciprocity theorists' argument that people in the game did not truly understand the game. However, research by both Kanazawa & Fontaine (2013) and Andreoni (1988) indicates otherwise, the former observed cooperation in the PD game under

expressed one-shot interactions, and the latter finding a repeated 50% contribution in the first round of the public good experiment performed by repeating individuals. Although there is evidence supporting the strong reciprocity theory it cannot account for some major discrepancies while the Savanna Principle is applicable to all situations, leaving the watching eye effect a tool to be examined.

Altruism which is i.) voluntary, ii.) costly to the actor, and iii.) beneficial for one or more organisms is controversial to Adam Smith's' explanation for modern economics; that an individual's self-interest response is also the most economically beneficial response, yet it is widely observed and a major reason for the success of our species. As the success of our species can be widely attributed to cumulative learning which derived from cooperation and altruism. Reasons for cooperation or altruistic tendencies despite any directly expected reciprocal treatment are claimed, by Chudek & Henrich (2011), to be a product of million years of cultural evolution affecting our genes and phenotypes. Based on "kin selection, reciprocal altruism, indirect reciprocity, costly signaling and group selection" (Burnham & Johnson, 2005, p. 113) these phenotypes have led "learners" to identify social groups that follow norms which facilitate prosocial behavior. Crucial within these groups are the culturally transmitted mechanisms, reputation, punishment, and signaling used as self-reinforcing cooperative norms which ultimately led to a genetic selection for prosocial psychology (Chudek & Henrich, 2011). Between and in group procreated explains why this psychology is globally present.

In light of the possible exploitation of the reputational mechanisms, researches have begun to search how and why this mechanism can work to influence others. Kawamura & Kusumi (2017), Bateson et al. (2013), and Fathi et al. (2014) found whether people were trying to form a good reputation or whether they were trying to avoid a bad reputation to be a distinctive factor in the reputation mechanism. People trying to create a good reputation would lead us to believe that society is prosocial while if people are trying to avoid a bad reputation people are trying to be more normative. Kawamura & Kusumi (2017) found contradicting results between their primary and repetition study. The original study providing support for the avoiding *a bad reputation hypothesis* as, the inclusion of "eyes promoted generosity only when a prosocial norm was present" (p. 12). The repetition study found no such results, and the studies by both Fathi et al. (2014) and Bateson et al. (2013) found results that supported people trying to get a prosocial reputation. The former finding a significant increase in average donations in the presence of eyes.

The latter finding that littering was reduced in the presence of eyes albeit more effective with increasing number of people present. To further support their findings of prosocial behavior, littering was constant or even reduced in the presence of eyes when litter was already present which without eyes would reinforce this behavior and litter would thus continue to build up. Finding that eyes promote prosocial behavior instead of leading to normative behavior has positive implications for the watching eyes effect as the latter would lead to negative societal consequences if the norm was lower than observed behavior.

Having established the plausible reasons why humans have adapted to cooperate even in unsuitable environments such as the PD game. It is crucial to examine the existing evidence supporting the effectiveness of the watching eye effect as a proxy for reputation. In all the previously mentioned games, the PD, the n-1 public goods, the dictator, and the allocation game, all have been performed using eye priming to establish the effectiveness of depicted eyes. In order to restrict the effect of the strong reciprocity, this analysis will focus on the PD game, most notably among the PD game studies is the one performed by Haley & Fessler (2005) as they are the first to find both a positive effect in increased mean donation as well as an increase in the probability of donation. Several studies have successfully replicated their findings, although there are those that have either found no effect or effects within subgroups. Nettle et al. (2013) have summarized the results of the studies performed on the PD game as well as their own, visible in table 1. The conclusion of the pooled results shows no significant effect in the increased mean donations, but show a highly significant ( $p < .05$ ) increased probability of donation when accounting for outlier shows an odds ratio of 1.6 (Nettle et al. 2013). However, the mixed results warrant further investigation towards the limiting factors of the watching eye effect.

**Table 1**

	Sample size	Increased mean donation effect		Increased probability of donation effect	
		Present ?	Cohen's <i>d</i>	Present ?	Odds ratio
Haley and Fessler (2005)	124	Yes	0.3	Yes	3.35
Rigdon et al. (2009)	113	No	0.18	Yes	1.91
Oda et al. (2011)	61	Yes	0.59	No	0.97
Keller and Pfattheicher (2011)b	100	Yes	0.06	Yes	0.89
Tane and Takezawa (2011)b	80	No	- 0.27	No	0.29
Raihani and Bshary (2012)d	291	No	- 0.16	Yes	2.32
This study	118	No	0.03	Yes	2.28
Overall	887	No	0.04	Yes	1.39

- a. Donating something was almost universal in this study (all but 4 participants), and so there was no power to detect an increased probability of donation effect.
- b. Studies 1 and 2 have been combined.
- c. Effect was moderated by the individual-difference trait prevention-focus. Effect not significant if prevention focus not included in model.
- d. Based on comparing just the 'eyes' and 'control' conditions, though a condition with images of flowers was also run. If the control and flower conditions are pooled to make a super-control condition, then  $p = 0.07$  for the increased probability of donation effect, and the odds ratio becomes 2.00.

Not only has the watching eye effect has been tested in laboratory setting economic games, but in real life settings as well. A primary study on the effectiveness of visual cues by Bateson et al. (2006) reveal a significant positive effect. In this study contributions to an honesty box for unmonitored drinks were much higher in the presence of eyes. This study was however subject to limiting factors. The group visiting the experiment site was small and recurrent therefore reputational concerns were of real importance. Also, they intimately knew the owner of the cafeteria and the other members again stressing real reputational threat. Finally, the higher

contributions to the honesty box could have resulted from an accompanying message asking for the contributions. The positive results however, should not be discounted as visual cues did seem to reinforce reputational concerns. Especially taking into consideration a follow up study by Ernest-Jones et al. (2011) where many issues were addressed. In this natural experiment, conditions were such that the effect of the message accompanying the watching eyes was measurable, and the visitors to this cafeteria were random and vast in number. The results again showed a significant increase in the reduction of litter when eyes were present irrespective of the message on the board. Suggesting that, it is the eyes alone that remind the subject of the reputational factors. One limitation that was observed in this study was similarly found in a study by Ekström (2011), conducting a natural experiment on charitable giving in the presence of eyes. In both studies the effect of eyes was more powerful if less people were present. This could be explained by the reduction in power of the eyes due to actual eyes present which have already been established to exert reputational pressure (Bateson et al, 2013). Also, one limiting factor to the study by Ernest-Jones et al. (2011) as well as that by Bateson et al. (2006) was that in both studies there was no accounting whether people came alone or with friends. This point is rather important as the presence of peers could induce real reputational pressures, the same could be said for Ekström (2011) although it is less likely due to the design of the experiment. This is why this study is performed in a setting where the natural setting for the individual is to be alone while being exposed to the eyes.

Although there is quite extensive evidence that the watching eye effect is a prominent factor in inducing prosocial behavior there is a concerning amount of studies finding null results. These null results should not be disregarded but also not seen as proof of false positives. Rather, these null results are most likely pointing to limiting factors of the watching eye effect like the one discussed in the previous paragraph where the number of people present affect the magnitude of the watching eye effect. Further research should therefore try to not only examine the existence of the watching eye effect but also its limitations.

One limitation to the reputational mechanism of watching eye effect is education. Evidence is suggestive of the notion that the watching eye effect and intellect could be negatively correlated. Marwell & Ames (1981) found that a group of University of Wisconsin economic graduate students playing the one-shot public goods game contributes less to the public good than other groups. The economists contributed 20% of their initial endowment rather than the average

40-60% (Dawes & Thaler, 1988). Kanazawa and Fontaine elaborate on this limitation by conducting the PD game and controlling for intelligence. Their hypothesis, that more intelligent individuals would cooperate less often in the PD game, was observed and statistically significant, predicting an gain of 4% chance of cooperation with every increase in IQ by a factor of 1. This hypothesis was formed on the basis of the Savanna Principle interacting with intellect in the sense that more intelligent individuals would be better at responding to novel evolutionary challenges. More intelligent individuals according to this theory would be better able to comprehend the strict anonymity of the PD game, and therefore be less influenced by the notion of reputation and lead to less cooperation. This proves to be an interesting point for the watching eye effect as it has not been tested whether intellect enhances the watching eye effect, as would be predicted by the strict reciprocity theory as well as the evolutionary legacy hypothesis, or decreases the watch eye effect as suggested by this study if you infer that a more intelligent person would be keenly aware that the mechanism is a false cue.

This leads us to the next limitation, duration to the exposure of visual cues. Real watching eyes have been confirmed to induce reputation guarding behavior and is therefore exempt from this limitation. However, Sparks & Barclay (2013) have found that short exposure to false cues such as depiction of eyes reliably increases the donation amount in economic games. While longer exposure to a false cue did not show a reliable result. This would indicate that longer exposure leads to the identification, subconsciously or consciously, that the cue is false and therefore not harmful to one's reputation. This however, has not been tested but could prove of vast importance as it would severely restrict the use of eyes. Sparks & Barclay (2013) have expressed further concern for a decline in the effect of watching eyes in the future. This due to the benefits expected from cooperation being unrealized as the eyes are mere pictures. A thus uninformative stimuli would lead to reduced response according to the general pattern of learning (Domjan, 2005). However, it must be said that this is speculative as both reputation and punishment have become an inherent mechanism for facilitating cooperation even in current society.

## **Methods**

This study is approached through two separate tests, a naturally occurring field experiment and a survey. Both are used to better understand the watching eye effect, to determine

whether visual priming has an effect on human behavior. The two tests each have their own purpose but simultaneously strengthen one another.

The first experiment is used to determine the effectiveness of this medium in real life situations. During this experiment data collected from google will be used to analyze whether eyes occurrent in google doodles, a picture temporarily replacing the google logo to celebrate holidays, events, achievements, and notable historical figures, have an effect on the frequency of certain search terms. Although all other research has focused purely on the effect of the watching eyes, this test will take place using dummy variables in the regression one representing human eyes and another representing non-human eyes, and finally an interaction term. In this manner it will be possible to check if the conflicting results found in previous research can be attributed to characteristics of eyes. Also, the search terms in this experiment are a proxy for behavior. The terms are split into three categories. Prosocial, terms or phrases that represent good causes that could positively affect society or the environment. Neutral, terms or phrases that have no bearing on the wellness of the person or society. And Antisocial, terms or phrases that can represent bad causes that could negatively affect society or the environment. The hypotheses for this experiment are dependent on the category of the search phrases and present themselves as the following:

Research suggests that altruistic tendencies and overall prosocial behavior increases when depicted eyes are present. Therefore, this notion is extended to see if eyes induce positive behavior in the form of researching positive phrases. The prosocial spectrum hypothesis is thus as follows.

*H1: The frequency of search terms in the prosocial spectrum will be positively affected when eyes are present.*

Considering research indicates that eyes are predicted to induce prosocial behavior. It is safe to assume that notions not in the social spectrum nor in the negative spectrum will not be affected by the presence of depicted eyes. The neutral spectrum hypothesis is thus as follows.

*H2: The frequency of search terms in the neutral spectrum will not be affected when eyes are present.*

Based off the precognition that eyes induce prosocial behavior, raising the number of positive search phrases, it can be extrapolated that antisocial search terms as a result will be negatively affected by the depicted eyes. The antisocial spectrum hypothesis is thus as follows.

*H3: The frequency of search terms in the antisocial spectrum will be negatively affected when eyes are present.*

In this manner all three possible outcomes are covered, and it is possible to more accurately predict what the effect of the watching eyes is. This naturally occurring experiment presents a near perfect opportunity to assess the impact of eyes since subjects are completely unaware of being assessed therefore eliminating the laboratory setting bias.

The second experiment presents itself in the form of a survey in which the subject is randomly assigned to a survey with or without eyes. In order to relax the demands of the watching eye effect the survey has a suggestive nature. This is necessary due to the contradictory findings from previous research. Unlike the previous experiment where it was testing whether depicted eyes effects free thinking, the survey will present options and therefore focus purely on the existence of a watching eye effect in a theoretical setting. In addition, the survey unlike the google experiment, allows for demographic questions and therefore allows for testing of other plausible factors affecting the outcome. The survey is also likely to enforce a secluded feeling as a study by Appel et al. (2019) insinuates that being behind a screen enhances the feeling of being isolated. Finally, the survey, available in the appendix, is set up in 4 parts of which the first part consists of demographic questions.

Part 2 is made up of dichotomous scale choices regarding the preference of a product or service. The choices are presented by name and graphical representation. One choice is beneficial for the individual and or society while the other option is detrimental to the individual and or society.

While for most questions the names identify the product or service there are 2 pictures where the names are identical besides the number preceding it. The picture/product in question are packaged chicken and packaged beef. The difference lies in the picture as one packaging will display a favorable trait while the other is ordinary. These presents a subset of questions within

this section in order to test if the watching eye effect will prompt the individual to examine the packaging more closely and be more attentive to prosocial cues. The hypotheses for these questions are as follows.

*H4a: The choice beneficial to society will be more frequently chosen in the presence of depicted eyes.*

*H4b: The choice beneficial to the individual will be more frequently chosen in the presence of depicted eyes if this choice can be translated to societal benefit.*

Part 3 is made up of binary choice questions. Here the participant could select either “yes” or “no” as an answer to various scenarios regarding health care coverage and cost. The questions have two natures. In the first the subject is asked to choose if financial penalties should be exacted on those engaging in harmful behavior. In the second, the subject is asked to choose if financial aid should be given to help end this harmful behavior. The two natures represent punishment and altruism and allows for two different hypotheses.

*H5: The choice to punish an individual will be chosen less frequently in the presence of eyes.*

*H6: The choice to aid an individual will be chosen more frequently in the presence of eyes.*

Part 4 is set up by priming the subject with a text expressing the start of a project. The subject is made to believe this project will actually happen and in addition is fully reliant on volunteers and donations. The subject is told he or she can request the project happen near them regardless of participation in order to eliminate the distance factor. This creates a realistic scenario in which the subject will be more inclined to answer truthfully. The subject is then asked three questions regarding interest in the project, willingness to volunteer, and willingness to donate. The response is measured on a 5-point semantic differential scale. The hypothesis for this segment is singular.

*H7: The choice to be involved in the project will be more frequent in the presence of depicted eyes.*

Part one of the study was a combination of existing data gathered from google trends and data cultivated from observations. The data from google trends consists of search phrase popularity on a 0-100 scale relative to the highest point in time. If the value reaches 100 it indicates the most popular time for that term, 50 indicates half as popular, and 0 indicates there was not enough data on that term at that time. The data covers the first half year of 2018. This is done in order to extract full data; time periods longer than half a year do not allow for daily data which is necessary in order to match the observations from the google doodles. Considering that 181 observation is a decently large sample size is enough to observe an effect. Further, the region from which the search terms occurred was limited to the United States of America. This because it again could match the data from the google doodles. Finally, the data was limited to web searches on google rather than searches on google images or otherwise. The search phrases were divided into three categories. Prosocial, phrases that have a beneficial connotation to society, these include, “help recycling”, “make donation”, “make sustainable”, and “save the rainforest”. Neutral, phrases that have neither a prosocial nor anti-social connotation these include “cute clothes”, “fun toys”, and “new video game”. Anti-social, phrases that have negative connotation to society these include, “dark net”, “make bomb”, “place bet”, and “porn”.

The google doodles, were analyzed at the source, google doodle archive, openly accessible to anyone. The region was restricted to the United States of America in order to ensure there was a direct match between search phrase frequency and google doodle’s occurrence. The time frame extended over the first half year of 2018 these are 181 observations including 49 observation where eyes were present. Further the images were classified by the following segments: how many eyes were present in the image; the origin of the eyes, human, animal, or other; the direction in which they are looking, towards, up, down, sideways; the size based on impactfulness of eyes split into tiny, small, medium, large; finally the position of the eyes open or closed.

Part two of the study, the survey was created using Qualtrics survey software. The distribution process was a combination of online mediums such as the social network Facebook, and survey sharing platforms such as Reddit, where researchers publish their survey and receive participants through filling out other surveys in return. In addition, participants were recruited through direct messaging. The majority of participants were located in Europe and the United States of America; however, the origin of participants has no perceived bearing on the outcome

of the study. Participants were able to take the survey only once and were randomly assigned to one with stimulus or one without. Further they were allowed to exit and resume the survey at any time till the survey would be closed. This closure happened three weeks after opening and resulted in 181 responses of which 151 were usable.

Part one of the study was prepared and analyzed using Stata 13. First off natural logs were taken for the dependent variables in order to address the relativity between the numbers within each variable. Further followed a Breusch Pagan test for homogeneity of variance. The results showed multiple variables for which homogeneity of variance was  $p < 0.05$  and therefore the null hypothesis constant variance had to be rejected. Finally, a test for normality using Shapiro Wilks was performed and results showed a violation in this assumption across a majority of the variables. However, due to the law of large numbers this violation can only be seen as mild and can be corrected using robust standard errors for all variables. All variables received robust standard errors in order to harmonize the analytic procedure. After analysis of the raw data the variable plb (place bet) and srf (save rainforest) were removed for having irregularly low data. Place bet most likely suffered from a significantly higher score on a certain day due to an event. Save rainforest had an excessive amount of unavailable data and were therefore were not used for regression analysis. Finally, since each independent variable is a factor of the main independent variable “effect” the variable effect is split into effect minus whatever variables are included in the regression. Due to the limited occurrence of the effect only one dummy was used in the regression in order not to lose explanatory power for the independent variable.

The survey was similarly analyzed using Stata 13. No manipulation to the original data took place besides the removal of data that showed illogical answers, or surveys that had a completion rate under 90%. This limit was drawn since it indicated that participants filled out most of the survey, above 90% usually meant they quit the survey when the last section of questions started. It therefore does not indicate that the participant was not interested in the previous questions leaving those valid for analysis. After the necessary removal of certain data, the Breusch Pagan test was used to check for heteroskedasticity. The test concluded the presence of heteroskedasticity across a majority of the variables. Due to the relatively large sample size of around 151 the heteroskedasticity was accounted for by using robust standard errors.

## Results

### Part 1

Table 2

Variable	Obs	Mean	std . dev.	Min	Max
Indnm	181	3.04	1.00	0	4.61
Inmab	181	3.77	.30	2.20	4.61
Inporn	181	4.39	.08	4.25	4.61
Incuc	181	4.01	.24	3.30	4.61
Infnt	181	3.63	.37	2.08	4.61
Innvg	181	3.89	.39	2.48	4.61
Inre	181	3.01	1.34	0	4.61
Inmad	181	3.87	.36	2.40	4.61
Inmas	181	2.81	.98	0	4.61

The descriptive statistics for the dependent variables show that the number of observations are constant at 181, google did not have any missing values. There are instances where the search term frequency is listed as 0, according to google there was too few data on the term in order to give it a higher value. These zeros are still relevant to the data. The mean values range from 4.39 for highest scoring variable Inporn to 2.81 for lowest scoring variable Inmas. The large change in the mean can be attributed to the frequency of zeros. The standard deviation is varying from low range .08 to a higher disparity of 1.34. This gives an indication of how constant the search term frequency is. Understandable the term porn was very constant in search term frequency. The small variance in this term suggests that the results from this particular regression will be more reliable. This is due to the ratio of the effect size of the stimulus compared to the variance. In larger variances there are most likely more factor leading to the higher disparity and

therefore the effect of eyes may be slightly diluted. Finally, the minimum value is 0 with a maximum value of 4.61 for all dependent variables.

### Preliminary Analysis

After accounting for the irregular data and the Gauss Markov assumptions there are four cases in which there are significant predictors at the 5% level, and one case significant at the 10% level. A success rate of roughly 5/9 does provide reason to consider a Bonferroni correction in order to avoid a Type I error. However, considering that the neutral terms are hypothesized not to be affected, although one is, leaves 4/6 variables that saw significant predictive power. A Bonferroni correction is thus not used, but the reference p-value would be  $p < 0.0083$ .

**Table 3**

Variables	VIF	D.W.	B.P.	S.W.
Darknet market	1.41	1.899	0.03	$p < 0.01$
Make a bomb	1.41	1.433	0.04	$p < 0.01$
porn	1.41	1.131	0.97	$p < 0.01$
Cute clothes	1.41	1.939	0.32	0.109
Fun toys	1.41	1.586	0.44	$p < 0.01$
New video game	1.41	1.870	0.91	$p < 0.01$
Help recycling	1.41	1.474	0.01	$p < 0.01$
Make a donation	1.41	1.936	0.64	$p < 0.01$
Make sustainable	1.41	2.065	0.25	$p < 0.01$

The variance inflation factor values are well below the threshold to dismiss multicollinearity. The Durbin-Watson statistics do suggest serial correlation for several variables, darknet market, cute clothes, new video game, make a donation, and make sustainable. For some of these variables there is an intuitive explanation, cute clothes, new video games and make a donation all refer to transactions that often coincide with sales periods or holiday events. The

other two variables darknet market and make sustainable are less intuitive. However, due to the limited data for the cause of this occurrence leaves a correction fallible. Therefore, the problem will remain untreated and the results will have to be taken with a grain of salt. The Breusch Pagan tests reveals that heteroskedasticity is present only darknet market, make a bomb, and help recycling. Finally, the Shapiro Wilks test results warrant the rejection of the null hypothesis on normally distributed errors. To correct for heteroscedasticity and non-normal errors, robust standard errors are applied for the final regression analysis.

**Table 4**

VARIABLES	lnnm	lnmab	lnporn	lncuc	lnfnt	lnnvg	lnhre	lnmad	lnmas
humandum	-0.16 (0.22)	0.11** (0.05)	-0.00 (0.02)	0.01 (0.05)	-0.07 (0.07)	-0.05 (0.08)	0.27 (0.23)	-0.09 (0.07)	-0.04 (0.25)
nonhuman	0.27* (0.15)	0.15** (0.06)	0.04** (0.02)	0.09 (0.06)	-0.22** (0.10)	-0.11 (0.12)	-0.50 (0.45)	0.22** (0.09)	-0.28 (0.32)
combined	-0.55 (0.56)	-0.15 (0.19)	-0.05 (0.04)	0.05 (0.10)	0.43** (0.20)	0.20 (0.19)	0.66 (0.54)	-0.04 (0.16)	0.26 (0.41)
Constant	3.06*** (0.09)	3.74*** (0.03)	4.39*** (0.01)	3.99*** (0.02)	3.66*** (0.03)	3.91*** (0.03)	3.00*** (0.12)	3.86*** (0.03)	2.84*** (0.08)
Observations	181	181	181	181	181	181	181	181	181
R-squared	0.02	0.03	0.02	0.02	0.03	0.01	0.02	0.04	0.01
Robust standard errors in parentheses									
*** p<0.01, ** p<0.05, * p<0.1									

The preceding regressions followed the following model:  $Y = \beta_0 + \beta_1 \text{human} + \beta_2 \text{nonhuman} + \beta_3 \text{combined}$ , using robust standard errors. For each regression three dummies were used as predictor variables. The predictor dummy “human”, received a 0 if human eyes were not present and 1 if human eyes were present. The predictor variable “nonhuman”, received value 0 if there were no non-human eyes and value 1 if non-human eyes were present. The predictor dummy “combined”, received a 0 if no eyes were present and 1 if both human and non-human eyes were present. This leaves 4 possible scenario for each regression. Condition 1: no eyes in which case only the intercept remain which is not necessarily indicative of anything considering these searches are merely meant as a proxy for behavior and the test is not meant for checking the overall starting value of the search term occurrence. 2: Only human eyes in which case the Beta of the human eyes condition singularly determines the effect size. This condition will show how human eyes affect the search term frequency and thus also how it would affect either antisocial, neutral, or prosocial thought processes. Condition 3: Only non-human eyes in which case the only effect is that by the eyes that are not human. The results under this condition will tell the story to which degree this stimulus will affect the search term frequency, which as stated before

is a proxy for behavior, and therefore it is proficient to assume that this stimulus will affect the behavior in a similar manner. Condition Finally, condition 4: in which both non-human and human eyes are present. This condition will tell how the combination of different eyes affect search term frequency and provide meaningful insight into how the eyes affect antisocial, neutral, and prosocial thought processes.

From the results it is evident there are five significant cases. Four cases are significant at the 5% level, and one significant at the 10% level. These 5 cases contain a diverse set-up, “make a donation” was a proxy for prosocial behavior, “darknet market”, “make a bomb”, and “porn” were proxies for antisocial behavior, and fun toys was a neutral term.

Model:  $\ln(\text{Darknet market}) = \beta_0 + \beta_1 \text{ human} + \beta_2 \text{ nonhuman} + \beta_2 \text{ combined}$ , using robust

The variable darknet market (Indnm) is significant. The predictor non-human eyes at the 10% ( $p=0.064$ ) with a coefficient (0.27) indicates that including non-human eyes increases this search term frequency by 27%. While the human eyes and the interaction term were not significant. This large positive effect opposes the predicted negative effect. Darknet market being a term that represents an illegal market falls in the negative spectrum and is hypothesized to be negatively affected by eyes.

Model:  $\ln(\text{make a bomb}) = \beta_0 + \beta_1 \text{ human} + \beta_2 \text{ nonhuman} + \beta_2 \text{ combined}$ , using robust

The variable make a bomb (mab) is significant. The predictor human is significant at the 5% level ( $p=0.022$ ) with a coefficient of (.11) indicating that including human eyes increases this search term frequency by 11%. The predictor non-human eyes is also significant at the 5% ( $p=0.022$ ) with a coefficient (.15). This indicates that the presence of eyes that are not human increases this search term frequency by 15%. The combination of human and nonhuman eyes did not have a significant effect. The effects found in this regression again go against the predicted pattern for a negative spectrum search term.

Model:  $\ln(\text{porn}) = \beta_0 + \beta_1 \text{ human} + \beta_2 \text{ nonhuman} + \beta_2 \text{ combined}$ , using robust

The variable porn found a significant predictor. The predictor non-human eyes at the 5% (p=0.041) with a coefficient (0.04) indicates that including non-human eyes increases this search term frequency by 4%. While the human eyes did not have a significant effect, nor did the combination of human and non-human eyes. The findings in this regression once again do not represent the hypothesis stated in the beginning of this paper, this negative search term was expected to decline in search frequency as a result of eyes.

Model:  $\ln(\text{fun toys}) = \beta_0 + \beta_1 \text{ human} + \beta_2 \text{ nonhuman} + \beta_2 \text{ combined}$ , using robust

The variable fun toys (fnt) shows there is significant predictive power at the 5 percent level for the variable non-human and the interaction term. Nonhuman (p=0.025) with coefficient (-0.22) indicates that the presence of non-human eyes reduces this search term frequency by 22%. The predictor human eyes was not significant, however, the interaction term where both human and non-human eyes were present was significant (p=0.028) with a coefficient of (.43) it states that this search term frequency increases by 43% when both forms of eyes are present. The results of this regression are surprising as this term was not predicted to be affected by the eyes due to it having a neither negative nor positive connotation.

Model:  $\ln(\text{make a donation}) = \beta_0 + \beta_1 \text{ human} + \beta_2 \text{ nonhuman} + \beta_2 \text{ combined}$ , using robust

The variable make a donation (mad) is significant. The predictor non-human eyes at the five percent level (p=0.015) with a coefficient of (0.22) indicates that non-human eyes increase this search term frequency by 22%. While the human eyes and the interaction effect did not prove to have significant predictive power. This positive spectrum search term was affected as predicted by the hypothesis.

## Part 2

**Table 5**

Gender	Male	46.36%
	Female	50.99%

	Undisclosed	2.65%
Education	Less than highschool	8.61%
	Highschool diploma	17.22%
	Some college	13.25%
	Associate degree	7.28%
	Bachelor diploma	38.41%
	Master diploma	13.91%
	Phd.	1.32%
Smoke	Never	80.13%
	Once a week	4.64%
	Several times a week	7.95%
	Once a day	0.66%
	More than once a day	6.62%
Sport	Never	16.56%
	Less than once a week	24.50%
	Once a week	15.89%
	2-3 days a week	21.85%
	3+ days a week	21.19%
Age	0-18	8.6%
	19-29	74%

	30-39	12.6%
	40-49	1.3%
	50+	4%

The descriptives show that of the 151 participants in this survey roughly half were men and half were women. Most participants had at least some form of higher education and over 50% had a bachelor's degree or more. The mean age was about 24-25 years of age which is expected as most surveys were filled out by students. A vast majority (80.13%) of the people who took this survey never smoke. While the distribution between the frequency of physical exercise is surprisingly equal with around 15-25% for each fitness category.

**Table 6**

	Observation	VIF	Breush-Pagan	Shapiro-Wilks
q1	151	1.09	0.21	p<0.001
q2	151	1.09	0.45	p<0.001
q3	151	1.09	0.11	p<0.001
q4	151	1.09	0.42	p<0.001
q5	151	1.09	0.03	p<0.001
q6	151	1.09	0.02	p<0.001
q7	146	1.08	0.05	p<0.001
q8	147	1.09	0.00	p<0.001
q9	151	1.09	0.01	p<0.001
q10	151	1.09	0.80	p<0.001
q11	151	1.09	0.26	p<0.001

q12	151	1.09	0.48	p<0.001
q13	151	1.09	0.12	p<0.001
q14	151	1.09	0.13	p<0.001
q15	151	1.09	0.01	p<0.001
q16	151	1.09	0.06	p<0.001
q17	143	1.10	0.60	p=0.01
q18	143	1.10	0.09	p=0.15
q19	141	1.10	0.89	p=0.05

Table 6 show observations range from 151 to 141, the loss of observations is due to missing variables. As in the case of the question 7 and 8, the pictures were very similar and perhaps few participants either did not want to choose or did not see a difference. The questionnaires for these individuals was further completed and showed no signs of disinterest and are therefore still included in the population. As for questions 17-19, this was another section in the questionnaire and perhaps participants found this too long and decided to quit before the survey was completed. As the Variance inflation factors show there is no sign of multicollinearity. The Breusch Pagan values indicate that there is heteroskedasticity present in various regressions. The Shapiro Wilks probability statistics also show that the errors are not normally distributed except for question 18 and 19. To account for these violations robust standard errors are used in all final regressions.

**Table 7A**

VARIABLES	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10
eyes	0.04 (0.08)	0.04 (0.08)	-0.03 (0.08)	-0.02 (0.06)	-0.14** (0.07)	-0.08 (0.07)	-0.06 (0.07)	-0.05 (0.06)	-0.03 (0.07)	0.03 (0.08)
gender	0.01 (0.08)	0.06 (0.07)	-0.13* (0.07)	0.04 (0.05)	0.03 (0.07)	0.12* (0.07)	0.11 (0.08)	0.06 (0.06)	0.12* (0.06)	-0.07 (0.07)
age	-0.01** (0.00)	-0.01 (0.01)	-0.01** (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)
education	-0.01 (0.03)	0.05* (0.03)	-0.01 (0.03)	-0.00 (0.02)	0.03 (0.02)	0.03 (0.02)	0.01 (0.02)	0.02 (0.02)	-0.06** (0.02)	-0.05** (0.03)
smoke	-0.02 (0.04)	0.07* (0.04)	-0.05 (0.04)	0.01 (0.02)	0.01 (0.03)	-0.02 (0.04)	0.06** (0.03)	-0.01 (0.02)	0.01 (0.04)	0.10*** (0.03)
sport	0.03 (0.03)	0.02 (0.03)	-0.02 (0.03)	-0.01 (0.02)	0.02 (0.02)	0.02 (0.03)	0.02 (0.02)	0.12*** (0.02)	-0.05* (0.03)	-0.03 (0.03)
Constant	22.30*** (8.52)	11.87 (10.70)	17.54** (7.73)	6.27 (6.13)	-3.72 (9.88)	-0.16 (9.56)	4.08 (10.83)	-1.03 (6.99)	1.53 (11.08)	-0.47 (9.03)
Observations	151	151	151	151	151	146	147	151	151	151
R-squared	0.03	0.08	0.05	0.01	0.04	0.05	0.05	0.18	0.10	0.10
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1										

**Table 7B**

VARIABLES	q11	q12	q13	q14	q15	q16	q17	q18	q19
eyes	0.00 (0.08)	-0.12 (0.08)	-0.04 (0.07)	-0.03 (0.07)	-0.01 (0.06)	-0.03 (0.06)	0.20 (0.18)	0.13 (0.18)	0.02 (0.17)
gender	0.07 (0.07)	0.11 (0.07)	-0.06 (0.06)	-0.04 (0.06)	-0.05 (0.05)	-0.02 (0.06)	-0.14 (0.17)	-0.41** (0.17)	-0.30* (0.17)
age	-0.00 (0.01)	0.01 (0.01)	0.00 (0.00)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
education	-0.05** (0.03)	-0.03 (0.03)	-0.00 (0.02)	0.02 (0.02)	0.02 (0.02)	0.01 (0.02)	-0.08 (0.06)	-0.06 (0.06)	-0.07 (0.05)
smoke	0.04 (0.04)	0.05 (0.03)	0.03 (0.04)	0.03 (0.04)	0.02 (0.03)	0.03 (0.04)	-0.23*** (0.07)	-0.20** (0.08)	-0.18** (0.08)
sport	-0.05* (0.03)	-0.04 (0.03)	0.01 (0.03)	0.02 (0.03)	0.00 (0.02)	0.02 (0.02)	-0.18*** (0.06)	-0.25*** (0.07)	-0.17*** (0.06)
Constant	2.00 (11.67)	-11.94 (10.09)	-7.63 (9.11)	-10.48 (8.68)	-5.52 (7.63)	-5.15 (8.44)	23.09 (22.91)	18.00 (23.05)	27.22 (24.08)
Observations	151	151	151	151	151	151	143	143	141
R-squared	0.07	0.08	0.02	0.03	0.03	0.02	0.13	0.15	0.10
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1									

The regressions for the survey follow the model  $Y = \beta_0 + \beta_1 \text{ eyes} + \beta_2 \text{ gender} + \beta_3 \text{ age} + \beta_4 \text{ Education} + \beta_5 \text{ smoke} + \beta_6 \text{ Sport}$  using robust standard errors to correct for heteroskedasticity. The independent variable Y represents the answers to various questions which on one end of the spectrum represent a beneficial aspect to the person or society while the other spectrum is detrimental to society. The regressions test whether eyes are effective at stimulating individuals in choosing the prosocial aspect. In addition to testing whether eyes are effective this survey uses several control variables such as gender; receives 0 if male 1 if female, age; measures by the year of birth, education; ranges in values 1 through 7 from less than high school diploma to PhD.

degree, and smoke and sport; both range from 1 through 5 where 1 represents never engaging in the activity mentioned and 5 being the most engaging in the activity mentioned. These test results will show whether eyes are effective at deterring antisocial behavior or effective at promoting altruistic behavior while controlling for various characteristics.

From Table 7A it is possible to see that out of 19 questions only question 5 sports eyes that proved to be a significant predictor at the 5% level with p-value (0.04). It indicates that the inclusion of eyes decreased the value by .14. This suggests that the inclusion of eyes makes it more likely for consumers to choose a soda beverage in an aluminum can rather than water in a plastic bottle. However, due to the incredibly small ratio of eyes being effective as opposed to not, this result is likely cause for a type I error and it thus is appropriate to apply a Bonferroni correction. This correction would level to a reference significant level of  $p < 0.0026$  which is far below the p-value of the eyes in this regression.

## **Discussion**

The results of this study are consistent with those of previous studies, that is to say contradictory evidence was found. The primary study on google doodles gave a strong indication that the watching eye effect is indeed present and also gives some valuable insight into the effect and how to continue research. The survey study however, provided no support for the existence of the watching eye effect. Possible reasons will be discussed later in this chapter.

### **Part 1**

Referring back to table 5 it is evident that an effect related to eyes is present, however, only in 1 case did a significant result behave in the way it was hypothesized. Also, 4/5 cases showed results that behave according to no intuitive explanation. The three negative search terms were all positively affected even though eyes were supposed to induce reputational concerns and therefore reduce the searches in this spectrum. Finally, 1 case showed significant results even though none were theorized. When taking a closer look at the hypothesis and the individual effects of the predictor variables a convoluted picture reveals itself.

Hypothesis 1: *The frequency of search terms in the prosocial spectrum will be positively affected when eyes are present.* The variables in this category, “help recycle”, “make a donation”, and “make sustainable” belong in the prosocial spectrum. Only one variable found significant

predictive power from the inclusion of nonhuman eyes. Make a donation notes a high increase in search term frequency when non-human eyes are present. The inclusion of this predictor increases this search term frequency by 22%. This effect seems large for an effect that is notoriously quite hard to identify. Considering this is the only search term in the positive spectrum that found significance it is difficult to accept the hypothesis based only on this result. The premises of this finding very understandable, considering that the non-human eyes belonged to either animals or inanimate objects, it is easy to assume animal eyes invoke a feeling of responsibility towards nature and therefore a higher increase of the likeliness to donate. For this reason, the hypothesis will not be rejected due to the limited significant findings.

Hypothesis 2: *The frequency of search terms in the neutral spectrum will not be affected when eyes are present.* This hypothesis is supported by two cases but opposed by one, “fun toys”. Surprisingly the predictors were both highly significant. This term bears no positive nor negative impact to a person or society and should therefore not be affected by the presence of eyes. One possibility is that due to the occurrence of google doodle coinciding with certain events, and events having a strong connection to toys, could have led to a false positive overall search. This would offer no explanation for the negative effect of non-human eyes. One could argue that again animal eyes, included in the non-human eyes, brought about a feeling of responsibility towards the environment and refrained people from search this term. However, more analysis would be necessary in order to find the validity of both statements, especially the former, considering that the other two variables “cute clothes” and “new video game” are also marketable items during events. Research into whether toys, particularly referring to young children toys are more common during the holidays would be a necessary control for future research.

Hypothesis 3: *The frequency of search terms in the antisocial spectrum will be negatively affected when eyes are present.* Variables, darknet market, make a bomb, and porn all fall within this category and test this hypothesis. All three variables saw positive effects while negative effects were predicted. First this is strong evidence to reject this negative spectrum hypothesis. Second, considering that all 3 variables saw a positive effect is a strong indication that there is something else going on. When looking at table 5 one can see that the combined effects are all negative but not significant. One possibility is that due to the limited occurrence of the combined effect the results are not as reliable as we like, future research or replication of this study should thus take a longer time period for analysis. There is no intuitive explanation as to why non-

human eyes would increase these search term frequencies. It is therefore a strong indication that these effects are unreliable, however due to the consistency of the found effect it is worth looking into what is actually causing this behavior.

Due to the contradictory evidence and the obscurely high effect of the stimulus, future research is warranted in order to check the validity of these findings. Although the effect size should be questioned, the large number of affected search terms suggests that there indeed is an effect from eyes. One reason to accept the large effects is due to the low  $R^2$  values, this indicates that only a small percentage of the actual change measured can be attributed to the effect of eyes. Regarding the hypotheses, the prosocial spectrum hypothesis is supported in one case by one variable, but all other cases countered both the neutral spectrum and the antisocial spectrum hypotheses. The opposition in signs, strength, significance between the human, non-human and the interaction term does provide an interesting point that the characteristics of eyes can be a determinant of whether the stimulus is effective. Since Multiple characteristics were observed in this study, preliminary testing with different predictors such as open or closed eyes, the size of eyes, and the direction of eyes proved to have different effects depending on the dependent variable. There was no previous research found examining different gender, species, sizes, direction or other characteristics of eyes that might be of consequence when testing the watching eye effect. The results from this paper suggest that the eyes effect may thus have to be more content specific. For instance, a regression performed in preliminary testing showed the variable “make sustainable” saw that animal eyes were a significant predictor, this would make sense as animals might invoke subconscious thought of nature combine this with the overall predicted prosocial thought and it becomes plausible that these eyes have a different effect than human eyes or inanimate objects with eyes. Another recommendation for future studies would be to find different more controlled natural field experiments. Although effects were found, there is no way to control for external stimulus although presumed not to be there due to the secluding effect that electronic devices have mentioned by Appel et al. (2019). On top of that, another concern for this study could be that individuals already know what to search for before going on google. However, even if this is the case since the eyes would still be presented before the search is entered it does not hinder the actual effect. Eyes could still subconsciously deter an individual from this search. Finally, it could be useful to analyze data over a longer time period for instance

two years. This would allow to control for seasonality, which could be a factor affecting some variables and also be a reason for the serial correlation that was found earlier.

## Part 2

After the Bonferroni correction, there were no significant cases in which eyes affected the outcome of a question. Even when disregarding the Bonferroni correction, the one case where eyes have effect, they make the person more likely to choose the unhealthy option which goes against what research suggests. Due to the lack of results pertaining to eyes the hypotheses specific to the survey are all to be rejected.

*H4a: The choice beneficial to society will be more frequently chosen in the presence of depicted eyes.* In the questions where individuals were able to choose between two alternatives where one displays an environmentally friendly option did not receive any significant results. Therefore, it is necessary to assume that eyes did not have an effect and this hypothesis has to be rejected.

*H4b: The choice beneficial to the individual will be more frequently chosen in the presence of depicted eyes if this choice can be translated to societal benefit.* In the questions where individuals were able to choose between two alternatives where one option displays a beneficial choice to the individual, which if chosen by the masses would translate to a societal benefit did not receive any significant results. Therefore, it is necessary to conclude that eyes have no effect on the outcome of these answers and thus this hypothesis is rejected.

H5: The choice to punish an individual will be chosen less frequently in the presence of eyes. In the questions where individuals were able to choose to punish or not a class of people engaging in harmful behavior toward him or herself which would ultimately translate to higher costs for society did not have any significant results. Therefore, it is necessary to conclude that eyes do not affect whether a person will punish another.

H6: The choice to aid an individual will be chosen more frequently in the presence of eyes. In the questions where individuals were able to choose to aid or not a class of people engaging in harmful behavior toward him or herself which would ultimately translate to higher costs for society did not have any significant results. Therefore, it is necessary to conclude that eyes do not affect whether a person will aid another. The increasing altruistic tendencies

suggested by the research from Bateson et al. (2013) does not find any supporting evidence in this test and therefore this hypothesis has to be rejected.

H7: The choice to be involved in the project will be more frequent in the presence of depicted eyes. In a realistically posed scenario individuals did not respond to the visual stimuli. The eyes were not significant and thus the preceding hypothesis has to be rejected.

The results of this survey were rather surprising even with the suggestive nature there was no significant effect found in any regression. However, this test was not without its merits. Unlike the first part, this test was able to control for certain characteristics such as gender, age, education, smoke, and sport. Since in many cases one of these variables did prove to be significant it can be said with some confidence that the characteristics of a person are more influential than the effect of depicted eyes. Especially when looking at the realistic scenario and the coinciding questions, 17, 18 and 19 it is possible to see that characteristics such as activeness and smoking have a large effect on whether someone will participate in a certain event.

There are limitations to this study. For one, all questions are hypothetical and the participants are aware that no reward or consequences will follow. This might eliminate some need to choose seriously. Further, since a large percentage of the population had at least their bachelor's degree it could be that these people are less affected by the watching eyes as they are more likely to perceive it as a fake sign and realize actual anonymity, therefore choosing as they normally would. As for the last three questions, they are dependent on whether the participant believed the scenario to be real or not. Another limitation is that the suggestive nature can be expressive. Allowing only two options where one is obviously bad, for instance the plastic vs paper bag, makes it unlikely for anyone to choose the plastic bag since it is generally known to be worse. Future studies should focus on more questions that the individual is sure have realistic consequences. In those instances, the individuals might feel societal pressure that could be reinforced by the depicted eyes, resulting in significant results. Finally, the time to complete the survey was recorded for studies however, it did not measure the time each participant took to answer a particular question. As Sparks & Barclay (2013) has demonstrated that the duration of exposure if of consequence in the watching eye effect it is recommended for future studies to put time limits or at least record response time per question.

## Conclusion

Overall it is disappointing to find that more contradictory evidence is found in the wake of these experiments. While a small percentage of the body of research indicates that the watching eye effect is indeed a viable means of reinforcing prosocial behavior. The majority of results from the first and second experiment rather contradicts this statement. Although there was an effect present in the majority of cases analyzed in the first experiment, the effect was sometimes of excessive magnitude and other times counterintuitive. With scattered results of whether the effects support the hypothesis it is important to acknowledge the findings of the second study. The second study provided strong evidence that the watching eye effect was not present, in light of the necessary corrections, there was not a single test that resulted in eyes being a significant predictor. When the intuition from these two tests are combined one can only conclude that research needs to be more stringent on the control variables. Since the first test did attest to the effect of eyes in a naturally occurring setting. But the second test made these findings questionable since it allowed for control variables, which proved to be much more powerful in predicting altruistic tendencies. Therefore, new naturally occurring field test should be explored allowing both complete privacy and characteristics observation.

While the overall viability and reliability of the watching eye effect is still debatable even in light of this research, the findings in this paper did contribute to the knowledge in this field. Only the prosocial spectrum hypothesis was supported by the evidence of this paper. However, more interesting are the results that supported that characteristics of eyes can be a determinant of whether the stimulus is effective or not. Future research should therefore focus on finding the best suitable type of eyes for various situations. In this manner the watching eye effect will be more accurately tested. In light of the second experiment it was found that characteristics and general behavior in humans are often a reason for differences in altruistic tendencies. The implications of this regarding the cooperation in economic games can be twofold. There are people with certain characteristics that are more trustworthy and altruistic therefore more likely to cooperate even in one-shot games regardless of depicted eyes present. Or, characteristics are a better determinant than eyes when it comes to cooperation. It is therefore warranted that in every field setting the characteristics of individuals are reported so it can be controlled for when running future tests.

While the use of search term frequencies as a proxy for behavior limits the generalizability of the results, this method and setting provided new insight into the effect of eyes. It was clear that without the stimulus of actual people present the depicted eyes still found significant results. It is thus possible that depicted eyes can alter human behavior and still in theory make people more altruistic. However, combining the results of the tests performed in this study and the results discussed in the literature review it becomes evident that the effect is sporadic and will most likely never be a reliable means of altering behavior in a positive manner.

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## Appendix

### Appendix I - Survey

Q1 What is your sex?

- Male (1)
- Female (2)
- Prefer not to answer (3)

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Page Break

Q2 What is your year of birth?

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Page Break

Q4 What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree (1)
- High school graduate (high school diploma or equivalent including GED) (2)
- Some college but no degree (3)
- Associate degree in college (2-year) (4)
- Bachelor's degree (5)
- Master's degree (6)
- Doctoral degree (7)

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Page Break

Q5 How often do you smoke?

- Never (1)
- Once a week (2)
- Several times a week (3)
- Once a day (4)
- More than once a day (5)

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Page Break

Q6 How often do you participate in sport or physical activity?

- Never (1)
  - Less than once a week (2)
  - Once a week (3)
  - 2-3 days a week (4)
  - More than 3 days a week (5)
- 

Page Break

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Q7 Which do you prefer?

- speedboat (1)
  - Sailboat (2)
- 

Page Break

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Q8 Which do you prefer?

- Electric car (1)
  - Regular car (2)
- 

Page Break

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Q9 Which do you prefer?

- Scooter (1)
- Electric bicycle (2)

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Page Break 

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Q10 Which do you prefer?

- Plastic bag (1)
- Paper bag (2)

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Page Break 

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Q11 Which do you prefer?

- Soda (1)
- Water (2)

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Page Break 

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Q12 Which do you prefer?

Mince meat 1 (1)

Mince Meat 2 (2)

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Page Break

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Q13 Which do you prefer?

Chicken 1 (1)

Chicken 2 (2)

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Page Break

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Q14 Which do you prefer?

Movies (1)

Gym (2)

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Page Break

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Q15 Should medical insurance be more expensive for high risk individuals?

Yes (1)

No (2)

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Page Break

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Q16 Should medical insurance be more expensive for smokers?

Yes (1)

No (2)

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Page Break

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Q17 Should medical insurance be more expensive for obese?

Yes (1)

No (2)

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Page Break

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Q18 Should medical insurance be more expensive for extreme sport athletes?

Yes (1)

No (2)

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Page Break

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Q19 Should medical insurance cover weight loss programs for obese?

Yes (1)

No (2)

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Page Break

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Q20 Should medical insurance cover rehabilitation for tobacco addicts?

Yes (1)

No (2)

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Page Break

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Q21 Should medical insurance cover rehabilitation for drug addicts?

Yes (1)

No (2)

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Page Break

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Q22 Should medical insurance cover rehabilitation for alcoholics?

Yes (1)

No (2)

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Page Break

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Please Read the following:

The creator of this survey is setting up a global cleanup initiative. This initiative will host projects cleaning up litter at various sites across the globe. The material necessary for cleanup will be provided by the organization. The locations can be requested by individuals regardless of their participation in the cleanup, and pend approval by the organization. The viability of these projects will be fully dependent on volunteers and donations.

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Page Break

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Q23 Are you interested in having this cleanup project near you?

- Definitely yes (1)
  - Probably yes (2)
  - Might or might not (3)
  - Probably not (4)
  - Definitely not (5)
- 

Page Break

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Q24 Are you interested in volunteering?

- Definitely yes (1)
- Probably yes (2)
- Might or might not (3)
- Probably not (4)
- Definitely not (5)

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Page Break

Q25 Are you interested in donating?

- Definitely yes (1)
- Probably yes (2)
- Might or might not (3)
- Probably not (4)
- Definitely not (5)

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Page Break