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Disgusted by Gruesome Evidence: The Role of Disgust, Attentional Control and Suppression of Emotions in Moral Judgments.

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Abstract

The present research investigated whether the color of gruesome visual evidence, individual differences in attentional control, and emotion suppression influence people's emotions and their subsequent judgments in the context of criminal justice in the Netherlands. In an eye tracking experiment participants watched gruesome photographs either in color or in black and white, while they suppressed their emotions or watched freely. In addition, participants completed an attentional control task, and a crime evaluation task. Gaze patterns were analyzed by comparing fixations to emotional AOI (AOIs; i.e., blood, wound, the victims' face and eyes) and neutral AOIs (i.e., neutral objects) between conditions. Results showed that gruesome photographs in black and white elicited more disgust than the same photographs in color, and people who watched the photographs freely judged the crimes more stringently than people who suppressed their emotions. No differences were found between conditions on the eye movement measures when the emotional AOIs were grouped. Exploratory results on the individual AOIs are discussed. Although the results of the present study are not in line with our hypotheses, they clearly illustrate that gruesome visual evidence may have unintended effects on how people evaluate crimes.

KEYWORDS: Attentional control, Disgust, Eye tracking, Gruesome photographic evidence, Moral Judgment.

Word count: 191

Disgusted by Gruesome Evidence: The Role of Disgust, Attentional Control and Suppression of Emotions in Moral Judgments.

Introduction

We live in a rapidly evolving digital age, and high quality photographs and videos are more easily accessible than ever. Not only do digitization and technological developments impact the Dutch society, also the Dutch criminal justice system starts to make more use of new technologies for collecting, analyzing and presenting audiovisual evidence (Vanderveen, 2011). In an effort to improve the performance of the Dutch criminal justice system, in 2016 all evidence will become digitally available and exchanged between the public prosecutor, the jurisdiction and the probation services (Vanderveen & Van Dillen, 2013; Openbaar Ministerie, 2011). With digitization it will become easier to reconstruct and depict crime scenes (Fowle & Schofield, 2011), and to convey large amounts of complex information (Schofield, 2009). However, although digitization offers new opportunities, it may have unintended effects on how people evaluate crimes. For instance, visual evidence is more intrusive and more persuasive than evidence in writing (Dubelaar, & Vanderveen, 2009). Similarly, viewers place undue reliance on visual evidence as viewers often consider it to be an objective representation of reality (Sherwin, 2007). Considering these findings, the digitization of gruesome visual evidence could potentially have a high impact on the Dutch criminal justice system. Yet, relatively little is known about how the new use of gruesome visual evidence may impact moral judgments. A better understanding of how people process gruesome evidence and whether their judgments are influenced by viewing gruesome visual evidence is needed, to avoid potential biases in the criminal justice system.

Several studies argue that if gruesome visual evidence is presented during a criminal trial it may arouse emotions in the judge and jurors and prejudice the defendant (Bornstein, 1998; Fagan Jr, 1993). Indeed, research conducted in the field of psychology and law indicates that emotions play an integral role in moral judgment and decision-making (Pizarro, 2000; Pizarro, Inbar, & Helion, 2011). Gruesome visual evidence can evoke strong negative emotional reactions, such as disgust, contempt, and anger (Vanderveen & Van Dillen, 2013; Whalen & Blanchard, 1982), which in turn, may result in more severe moral judgments (Capestany, & Harris, 2014; Leader, Mullen, & Abrams, 2007; Schnall, Haidt, Clore, & Jordan, 2008), and increase conviction rates (Bright & Goodman-Delahunty, 2011). Most interestingly in the context of criminal law, ample research showed that gruesome visual evidence of violations of social and moral norms, reliably elicits disgust, as measured by explicit self-report, implicit behavioral measures and facial expressions (for a review, see Chapman & Anderson, 2013).

As criminal justice typically deals with violations of social and moral norms, disgust may also bias people's judgments of criminal trials. Since biases are detrimental to a fair trial, it is important to further investigate the role of disgust in moral judgment in the context of criminal justice in the Netherlands. On the one hand the social intuitionism theory (Haidt, 2001; Haidt, McCauley, & Rozin, 1994) proposes that disgust, like other emotions, is driven by quick and automatic affective intuitions. On the other hand, several studies have illustrated that effortful cognitive control (Blechert, Sheppes, Di Tella, Williams & Gross, 2012) and distraction (Van Dillen, Van der Wal & Van den Bos, 2012) can lead to effective emotion regulation and reappraisal of subsequent moral judgments. In line with this reasoning people often have the assumption that the presence of emotions is detrimental to accurate and fair moral decision-

making, and try to overcome emotional biases by consciously suppressing their emotions (Pizarro, 2000).

In the present study we examined the relationship between disgust and moral judgment in the context of criminal justice in the Netherlands, zooming in on whether the color of gruesome visual evidence, emotion suppression, and individual differences in attentional control influence crime evaluations. The present experiment combined self-report measures with eye movement measures to gain insight in whether participants differed in how they process gruesome visual evidence, where attention was directed, and how they evaluated the crimes. In the following sections of this introduction each of the theoretical concepts will be discussed further. First, we describe how the color of gruesome visual evidence may unintendedly affect how individuals process gruesome visual evidence and bias subsequent moral judgments. Secondly, we describe how individual differences in attentional control may regulate influences of emotions on moral judgments. Thirdly, we discuss whether people are able to consciously control how they process emotional stimuli while making moral judgments. Lastly, we provide a detailed description of the eye movement measures, focusing on the emotional content of the visual evidence and gaze patterns.

Visual Evidence

Currently some courthouses still use copies of gruesome visual evidence in black and white (Vanderveen & Dillen, 2013). The main concern with the digitization of this visual evidence is that it will contain more color, detail and visual information, which may have a more powerful impact on people's emotions. In particular, emotional features of gruesome photographs (e.g., blood) may be more striking in colorful photographs. Studies in which people viewed a variety of photographs showed that features of photographs such as contrast, color, texture, and luminance

determine looking behavior. For example, people tend to fixate more on areas of higher contrast and luminance (Açik, Onat, Schumann, Einhäuser, & König, 2009; Parkhurst, & Niebur, 2003; Reinagel, & Zador, 1999). In addition, people experience more physical reactions, such as sweaty palms, to watching gruesome visual evidence in color compared to the same evidence in black and white (Douglas, Lyon, Ogloff, 1997), which indicates that people are more emotionally affected by colorful photographic evidence than by photographs in black and white (Bradley, 2009). Indeed, other studies investigating the role of visual evidence in decision-making showed that people are more stringent in their moral judgments after viewing colorful gruesome photographs than after viewing the same photographs in black and white (Oliver & Griffitt, 1976; Whalen & Blanchard, 1982). In line with previous research it is hypothesized that individuals will have a greater emotional reaction to gruesome photographic evidence in color compared to the same photographs in black and white. Subsequently, if viewing gruesome photographic evidence in color evokes more disgust than viewing the same photographic evidence in black and white, it should also have a stronger biasing effect on moral judgments than photographs in black and white.

Attentional Control

Emotion and attention are inextricably connected (Bradley, 2009). When people view gruesome visual evidence, their attention is directed to the emotional information in a quick, automatic, and unintentional manner. In turn, the emotional information can elicit emotional responses (Bradley, 2009), which can influence people's moral judgment of the following events (Pizarro, 2000; Schnall, Haidt, Clore, & Jordan, 2008). Research has indicated that individuals differ in the ability to voluntarily control attention. Individuals with low attentional control are less able to inhibit automatic responses compared to individuals with high attentional control.

For example, individuals with low attentional control are less able to ignore the content of words in a Stroop task (Stroop, 1935), and generally have slower correct responses to incongruent trials (i.e., font color mismatches the content of the word), compared to individuals with high attentional control (Derryberry & Reed, 2002). Furthermore, attentional control processes regulate influences of emotions on moral judgments, such that individuals with high attentional control are better in disengaging from emotionally disturbing information compared to individuals with low attentional control (Gyurak & Ayduk, 2007; Peers & Lawrence, 2009; Van Dillen, Van der Wal & Van den Bos, 2012). Therefore it is hypothesized that individuals with low attentional control are less able to limit their emotional reactions to gruesome visual evidence than those with high attentional control, and thus are less able to reduce the influence of disgust on moral judgment. Subsequently, if colorful gruesome visual evidence evokes more disgust than viewing the same visual evidence in black and white, individuals with low attentional control should experience a stronger biasing effect on moral judgment than individuals with high attentional control. In addition to individual differences in attentional control, individuals differ in disgust sensitivity, which is defined as the propensity to experience disgust (Haidt, McCauley, & Rozin, 1994). Since individual differences in disgust sensitivity are associated with variation in moral judgments (Chapman & Anderson, 2013), such that heightened disgust sensitivity results in more severe judgments of moral transgressions, disgust sensitivity will be taken into account as a covariate.

Emotion Suppression

In practice, people often have the assumption that the presence of emotions is detrimental to accurate and fair moral decision-making, and try to overcome emotional biases by consciously suppressing their emotions (Kant, 1785; Pizarro, 2000). However, research indicates that

intentional conscious attempts at suppressing emotions usually backfires (Wenzlaff & Wegner, 2000; Abramowitz, Tolin, & Street, 2001), leading people to attend more to the emotion they are trying to suppress (Wegner & Erber, 1991), and more frequent occurrences of the unwanted emotion (Wegner, 1992), which Wegner and colleagues have labeled ironic rebound effects. Therefore it is of interest to examine whether people's beliefs are valid, hence, whether people are able to consciously control how they process emotional stimuli while making moral judgments. If intentionally and consciously suppressing emotions leads individuals to think more about the emotion they are trying to suppress, as is predicted on the basis of ironic rebound theory, it is hypothesized that suppressing emotions has a stronger biasing effect on moral judgments than merely allowing the presence of emotions. Subsequently, it is hypothesized that if gruesome visual evidence in color elicits more disgust than viewing the same visual evidence in black and white, the ironic rebound of suppressing emotions on moral judgments should be the strongest for individuals who viewed the visual evidence in color. However, recent studies (Blechert, Sheppes, Di Tella, Williams & Gross, 2012; Van Dillen, Van der Wal & Van den Bos, 2012) have demonstrated that effortful cognitive control can lead to successful emotion regulation and reappraisal of subsequent moral judgments. Therefore an alternative outcome may be that suppressing emotions does not lead to an ironic rebound effect, but that moral judgments are less biased when emotions are suppressed. The eye-tracking paradigm used in the current experiment may provide valuable information on what gaze strategies individuals use when they suppress their emotions.

Emotional Content and Gaze Patterns

In general, eye movement research shows that emotional content affects gaze patterns. People tend to fixate on emotional aspects of visual stimuli more quickly, for longer periods of

time, and more frequently than on neutral aspects of these stimuli (Alpers, 2008; Calvo & Lang, 2004; Calvo & Lang, 2005; Kissler & Keil, 2008). If photographs contain an unexpected element, people spend more time fixating on this element (Becker, Pashler & Lubin, 2007), and especially the content of emotionally charged photographs draws attention as indicated by longer fixation durations (Nummenmaa et al., 2006). In the present study areas of interest (AOI) were defined based on these findings. A distinction was made between emotional AOIs (i.e., blood, the victims' face, the victims' eyes, and the wound) and neutral AOIs (i.e., neutral objects such as a lamp, a phone, and a magazine on the nightstand). Since colorful gruesome photographs depict the crime scene in more detail, and provide more vivid and emotionally charged information compared to photographs in black and white, it is expected that participants viewing the photographs in color will fixate to the emotional AOI more quickly, more often, and longer compared to the participants viewing the photographs in black and white.

In addition, eye movements provide information about where attention is directed (Hoffman & Subramaniam, 1995; Deubel & Schneider, 1996; Corbetta, 1998). Hence, differences in attentional control are likely to result in different eye movement patterns. As individuals with low attentional control are less able to inhibit automatic responses, it is expected that individuals with low attentional control will fixate to the emotional AOI more quickly, more often, and longer compared to the individuals with high attentional control. Furthermore, participants with low attentional control are expected to fixate to the emotional AOI more quickly, more often, and longer compared to individuals with high attentional control, especially when they viewed colorful gruesome photographs, compared to when they viewed gruesome photographs in black and white.

If people attend more to the emotion they are trying to suppress (Wegner & Erber, 1991) it is expected that participants who suppress their emotional reaction to the gruesome photographic evidence will fixate to the emotional AOI more quickly, more often, and longer compared to the participants who do not suppress their emotional reactions. Lastly, it is expected that participants who suppress their emotional reaction to the gruesome photographic evidence will fixate to the emotional AOI more quickly, more often, and longer compared to the participants who do not suppress their emotional reactions, especially when they viewed colorful gruesome photographs, compared to when they viewed gruesome photographs in black and white. Finally, individual differences and attempts to suppress emotions should interact, such that especially individuals with low attentional control should display this ironic rebound effect of suppression.

Method

Participants

A total of 162 Dutch participants took part in the experiment. Before carrying out our analyses, we excluded data of 21 participants for which the eye-tracking signal was poor (i.e., more than 25% invalid data due to blinks and off-screen gazes; 14 participants; Duchowski, 2007), or for which practical issues[1] rendered the data unusable (7 participants). This resulted in a sample of 141 participants (103 females and 38 males, M_{age} = 21.79 years, SD_{age} = 3.70 years, range = 18 – 35 years). All participants had normal or corrected-to-normal vision, were right-handed, and naïve to the purpose of the experiment.

Participants were recruited at Leiden University Faculty of Social and Behavioral Sciences and Leiden University Medical Center by conversations in person and by distributing flyers. In addition, ads were placed on several Facebook discussion groups (e.g., discussion

boards of Leiden University students, research participants, and inhabitants of the region). In exchange for their participation participants received five euros or course credit. All participants provided written informed consent, which contained a warning that some individuals might find the photographs used in the experiment gruesome and shocking. The study was approved by the Ethics Committee of Leiden University.

Design

The experiment had a 2 (visual evidence; color vs. black and white) x 2 (instruction: watch vs. suppress) between-subjects design. Participants were randomly assigned to one of two visual evidence conditions and one of two instruction conditions (with 33 to 37 participants per condition). Additionally, participants' individual differences in attentional control were included as a continuous between-subjects measure. The main dependent variables were participants' judgment regarding the crime, and participants' gaze patterns.

Apparatus

The experiment was conducted using a 15,6" laptop, with a resolution of 1920 x 1080 pixels. Eye movement data were collected using the Tobii X2-60 Eye Tracker (Tobii Technology, Stockholm, Sweden), which emits pulsed infrared light at a sampling rate of 60 Hz. Since the Tobii X2-60 Eye Tracker allows for extensive head movement no chin rest was needed to minimize head movements of the participants.

Materials

Attentional control. Individual differences in the ability to voluntarily control attention were measured by an adapted version of the Stroop task[2] (Stroop, 1935; Fennis & Jansen, 2010), which is a powerful yet simple task to measure attentional control (Milham et al., 2002; Roelofs, 2003). Each experimental trial started with a black fixation cross presented in the center of the

screen, with a random duration between 500 ms – 3000 ms. Four Dutch color words and four font colors were used; blue, red, green, and yellow. Participants were instructed to identify the font color of each word as quickly and accurately as possible by pressing one of four keys on the keyboard, while ignoring the content of the words (Stroop, 1935). Firstly, participants practiced the color-key combination on 40 trials, consisting of solely colors. After each response participants received feedback on their performance (correct or incorrect). Next, participants completed 8 randomized practice trials, consisting of 4 congruent trials (i.e., font color matches content of the word) and 4 incongruent trials (i.e., font color mismatches content of the word). After completing both practice blocks participants were given the opportunity to take a short break. Finally, participants were presented with 32 randomized trials, of which 8 were congruent and 24 were incongruent.

Attentional control was derived from participants' individual Stroop interference scores on incongruent trials. It requires attentional control to inhibit the automatic propensity to read the content of words on incongruent trials. Participants with low attentional control are poor at inhibiting their automatic responses, and hence have slower correct responses on incongruent trials (Derryberry & Reed, 2002). Per participant a mean Stroop interference score was calculated by computing the mean reaction time on accurate incongruent trials in milliseconds. Unfortunately, due to a technical error, reaction times on the Stroop task were cut off at 1000 ms. Consequently, each trial with a response slower than 1000 ms was counted as an error (i.e., accuracy = 0) and a missing value was assigned to the reaction time. Since Stroop interference scores often exceed 1000 ms (e.g., Van Dillen, van der Wal & van den Bos, 2012), this error was problematic for analyses including this measure of attentional control. For this reason attentional control was not considered in further analyses.

Disgust sensitivity. Individual differences in the propensity to experience disgust (i.e., disgust sensitivity) were assessed using the Disgust Scale - Revised (DS-R; Haidt, McCauley, & Rozin, 1994, modified by Olatunji et al., 2007), which is a 24-item scale measuring disgust sensitivity across three domains: core disgust, animal-reminder disgust, and contamination disgust. In part I participants were asked to rate their agreement with 12 statements (e.g., "*I might be willing to try eating monkey meat, under some circumstances.*") on a scale from 0 (true) to 1 (false). One item was reverse-scored. In part II participants rated how disgusting they would find 12 specific experiences (e.g., "*If you see someone put ketchup on vanilla ice cream and eat it.*") on a scale from 0 (not disgusting at all) to 4 (extremely disgusting). Cronbach´s alpha for the 24-item DS-R was low ($\alpha = .50$), which was mainly due to part I ($\alpha = .50$). Since part II reached a good reliability ($\alpha = .78$) we decided to calculate disgust sensitivity based on only the second part of the DS-R, as the standardized mean of the 12 items.

Instruction. Participants received the following instruction before they were presented with the gruesome photographic evidence: *"You will be shown photographs of a crime scene. After viewing the photographs you will be asked to evaluate the crime"*. Participants in the emotion suppression condition were then instructed to suppress their emotional reaction while looking at the photographs, whereas participants in the watch condition were asked to look at the photographs as they would normally do when they looked at photographs. All participants were instructed to focus on the fixation cross between trials.

Visual evidence. Two cases were selected from the database of Gruesome visual evidence (Vanderveen, 2013). The visual evidence was created in collaboration with the Police Academy of the Netherlands, and portrayed reconstructed but realistic crime scenes. One male (case 1) and one female actor (case 2) depicted a murder victim, each lying in bed with their eyes open, a head

wound, and a large amount of blood on the head and pillow case. Each case consisted of one midrange photograph and one close-up photograph[3]. A black and white version of each photograph was created using Adobe Photoshop CS6. Special attention was paid to maintaining the exact same feature contrast and luminance of each photograph, in order to rule out effects of salience on eye movements (Eckstein, 2011). Participants were presented with the four gruesome photographs, while their eye movement data were recorded and analyzed. Each photograph was presented for 5 s, and prior to each photograph a black fixation cross was presented in the center of the screen for 500 ms. Participants in the color condition viewed the gruesome photographs in color, whereas participants in the black and white condition viewed the gruesome photographs in black and white. Pilot ratings of the visual evidence (N = 21) on a Likert scale ranging from 1 (not at all) to 7 (extremely) showed that all four gruesome photographs were perceived to be significantly more disgusting in color (M = 4.23, SD = 1.55) than in black and white (M = 3.77, SD = 1.54), $t(20) = 12.49$, $p < .001$.

Five AOIs were defined per photograph, in which a distinction was made between emotional AOIs and neutral AOIs (see Figure 1 for an overview of the AOIs). The emotional AOIs were the blood, the victims' face, the eyes, and the wound. The blood area was defined by 3.5°x 5.3° of visual angle, which included all blood spatters and was shaped like a trapezoid. The victims' face covered 4.4°x 3.5° of visual angle, and included the oval contour of the face (Eisenbarth & Alpers, 2011). The eyes covered 0.7°x 0.9° of visual angle, and included an oval shape from the eyebrow to the bottom of the eye socket (Darby & Harris, 2010). The wound covered 0.9°x 1.3° of visual angle, and was shaped like a heptagon. The eyes were grouped in one eyes AOI, and all blood spatters were grouped in one blood AOI. The neutral AOIs were objects in the room (e.g., a lamp, phone, magazine, and other objects on the nightstand), which

were considered neutral and irrelevant for the assessment of the severity of the crime. The objects covered 7.0°x 7.9° of visual angle. All objects were grouped in one neutral AOI. Per photograph the AOIs were exactly the same for the color version and black and white version, and overlap between AOI was corrected (i.e., blood AOI = blood – wound; face AOI = face – eyes).

Crime evaluation. Following the visual evidence, participants read two corresponding case reports (see Appendix A). As a first measure of crime evaluation, participants rated the severity of the visual evidence with six items (e.g., "*I feel bad about what happened to the victim"*; see Appendix B for all items) on a scale from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha was .85.

As a second measure of crime evaluation, participants read a short statement "*The offender has been caught and sentenced, the court considered the charges proven and has declared both the offender and the fact a criminal offense"*, and assigned an unconditional prison sentence in months and/or years to the offender (based on Kampen, de Keijser & Schoep, 2013). In order to limit possible confounding factors (e.g., intent of offender) no additional information about the cases was provided, and no sentencing guidelines were provided.

Manipulation check. As a manipulation check, participants viewed the gruesome photographs again and rated the extent to which the photographs were gruesome, serious, disgusting, gory and scary on a scale from 1 (not at all) to 7 (extremely). Participants completed several open questions on general demographic information (i.e., age, sex, study, and work), and experimental procedure (i.e., knowledge of the purpose of the study). Lastly participants indicated their knowledge of scientific research on emotions, on a scale from 0 (barely) to 4 (extremely), and experience with viewing gruesome visual evidence, on a scale from 0 (never) to 4 (often).

Procedure

Participants were tested individually. When entering the research lab, participants were seated straight in front of the Tobii X2-60 Eye Tracker (Tobii Technology, Stockholm, Sweden), at approximately 65 cm from the eye tracker, in a sound attenuated cubicle. If necessary, the seat and position of the participant were adjusted. First, participants completed an attentional control task and a disgust sensitivity questionnaire. Next, eye movement data were collected while participants viewed the gruesome photographic evidence of the two crimes. Before starting the eye-tracking task, the lights were dimmed and a standard 9-point calibration was performed. Participants were instructed not to look off-screen and to remain seated in their current position during the eye-tracking task. Further instructions were provided on the computer screen, and depending on conditions participants were instructed to watch freely or suppress their emotions. Following the eye-tracking task, the lights were again switched on and participants read the two case reports, after each of which they rated the severity of the visual evidence and assigned an unconditional prison sentence in months and/or years to the offender. Finally, participants completed a manipulation check and a questionnaire on general demographic information, expertise, and experimental procedure. At the end of the study participants were debriefed, thanked and dismissed. On average the entire experiment took 40 minutes.

Data Analysis

Tobii Studio (version 3.2.1) was used in conjunction with Microsoft Excel 2010 and SPSS 21 to analyze, aggregate, and export the data. The raw eye movement data points were processed into attentional eye movements using the Tobii Velocity-Threshold Identification (I-VT) filter. Fixations were defined as a set of consecutive gaze coordinates, confined within a diameter of 0.5° visual angle, for a minimum duration of 60 ms. The I-VT filter classifies

fixations with a velocity threshold value of 30°/s (Olsen, 2012). Individual trials consisting of more than 25% invalid eye movement data were removed (2.6% of the trials).

Three types of eye movement measures were collected for each photograph: (a) time to first fixation, (b) fixation count, and (c) total fixation duration. Time to first fixation is defined as the time from the start of the stimulus display until the participant fixates on the AOI in seconds. Fixation count is defined as the number of times the participant fixates on the AOI. Total fixation duration is defined as the sum of all fixation durations within an AOI in seconds. For each type of eye movement measure the percentage proportion was calculated per participant. For each AOI (i.e., face, eyes, wound, blood, neutral objects), the time to first fixation was divided by the total time to first fixation * 100 (based on Horley et al., 2004). The percentage proportion of number of fixations and total fixation duration were calculated in an identical manner.

Results

Preliminary analyses

The data were analyzed using SPSS (version 20), and we used an alpha level of .05 for all statistical tests. Individual differences in disgust sensitivity (M = 2.62, SD = 0.48) did not differ between conditions, p = .563, η_p^2 = 02, and did not influence the results. Therefore disgust sensitivity was not included as a covariate in further analyses.

Manipulation check

A between-subjects multivariate analysis of variance (MANOVA) of participants' ratings of the visual evidence with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and ratings of photo 1, photo 2, photo 3, and photo 4 as dependent variables, revealed a multivariate effect of color of the visual evidence on disgust ratings, F(4,

134) = 5.33, $p < .001$, $\eta_p^2 = .14$. Univariate effects of color (color vs. black and white) on disgust ratings were found for photo 1, $F(1, 141) = 7.85$, $p = .006$, $\eta_p^2 = .05$, and photo 2 $F(1, 141) = 7.85$, $p = .009$, $\eta_p^2 = .05$, such that participants reported more disgust in the black and white condition than in the color condition on case 1. No significant differences in disgust ratings were found for photo 3 ($p = .758$, $\eta_p^2 = .00$) and photo 4 ($p = .983$, $\eta_p^2 = .00$). No multivariate effect of instruction on disgust ratings was found ($p = .633$, $\eta_p^2 = .02$), suggesting that participants who were instructed to suppress their emotions and participants who watched the photographs freely reported similar levels of disgust in response to the photographs. The interaction between color and instruction conditions on disgust ratings was not significant either, ($p = .917$, $\eta_p^2 = .01$). These findings indicate that the intended manipulation of the independent variables failed, and contrary to our pilot test, the photographs of case 1 (i.e., photo 1 and 2) elicited more disgust when presented in black and white than when they were presented in color, and no differences in disgust ratings were found for the photographs of case 2 (i.e., photo 3 and 4). Means and standard deviations are presented in Table 1.

Crime evaluation

To investigate whether the color and instruction manipulation affected participants' evaluation of the crimes, we conducted a between-subjects analysis of variance (ANOVA) with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and participants' ratings of the severity of the crime as dependent variable. This analysis yielded a significant effect of instruction (watch vs. suppress) on participants' evaluation of the crimes, $F(1, 141) = 4{,}73$, $p = .031$, $\eta_p^2 = .03$. Contrary to our hypotheses, individuals in the watch condition were more disapproving of the crimes than participants in the suppress condition. No significant main ($p = .977$, $\eta_p^2 = .00$), or interaction ($p = .674$, $\eta_p^2 = .00$) effects of color on crime

evaluation were found, suggesting that individuals evaluated the crimes in a similar fashion, independent of whether the photographs were presented in color or in black and white.

In addition, participants' evaluation of the crimes was measured in terms of an unconditional prison sentence in years. Participants assigned prison sentences ranging from 0.75 to 58.33 years to the offender. A between-subjects analysis of variance (ANOVA) with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and prison sentence in years as dependent variable, revealed no significant effect of color condition (p = .819, η_p^2 = .00), and instruction condition (p = .380, η_p^2 = .00). The interaction between color and instruction conditions on prison sentence was not significant either (p = .459, η_p^2 = .00). Three outliers were identified, however excluding these outliers did not change the results. Means and standard deviations of both crime evaluation measures are presented in Table 1.

Time to first fixation on emotional AOI versus control AOI

To assess the effects of color and instruction on the time to first fixation on emotional AOIs versus the neutral AOIs, the blood, face, eyes, and wound AOIs were combined into one emotional AOI, and the neutral AOIs were grouped as one neutral AOI. Next, we conducted a between-subjects multivariate analysis of variance (MANOVA), with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and AOIs (emotional, neutral) as dependent variables. Contrary to our hypotheses this analysis yielded no significant main effects of color (p = .629, η_p^2 = .01), instruction (p = .306, η_p^2 = .02), or interaction between color and instruction conditions on the time to first fixation on the emotional AOIs and neutral AOIs factors (p = .546, η_p^2 = .01).

To further investigate the gaze patterns we conducted a between-subjects multivariate analysis of variance (MANOVA), with color (color vs. black and white) and instruction (watch

vs. suppress) as independent variables, and five individual AOIs (i.e., blood, face, eyes, wound, neutral AOIs) as dependent variables. This analysis revealed a multivariate effect of color of the visual evidence on the proportion of time to first fixation on the AOIs, $F(5, 106) = 2.51$, $p = .034$, $\eta_p^2 = .11$. An univariate effect of color (color vs. black and white) on the proportion of time to first fixation was found for the wound AOI, $F(1, 141) = 6.22$, $p = .014$, $\eta_p^2 = .05$. In line with previous findings participants in the color condition took proportionally longer to fixate on the wound ($M = 22\%$, $SD = 11\%$) than participants in the black and white condition ($M = 17\%$, $SD = 11\%$). No significant main effects were found for the other AOIs ($p_{face} = .087$, $\eta_p^2{}_{face} = .03$; $p_{eyes} = .901$, $\eta_p^2{}_{eyes} = .00$; $p_{blood} = .148$, $\eta_p^2{}_{\text{blood}} = .02$; $p_{neutral} = .414$, $\eta_p^2{}_{neutral} = .01$). No multivariate effect of instruction on the proportion of time to first fixation on the AOIs was found ($p = .916$, $\eta_p^2 = .01$), suggesting that participants who were instructed to suppress their emotions and participants who watched the photographs freely fixated on the AOIs in a similar manner. No interaction was found between color and instruction conditions on the proportion of time to first fixation on the AOIs, ($p = .996$, $\eta_p^2 = .00$).

Total fixation duration on emotional AOI versus control AOI

To investigate whether the color and instruction affected participants' total fixation duration on the emotional AOIs and the neutral AOIs, a multivariate analysis of variance (MANOVA), with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and emotional AOIs factor and neutral AOIs factor as dependent variables was performed. This analysis revealed no significant main effects of color ($p = .551$, $\eta_p^2 = .00$), and instruction ($p = .273$, $\eta_p^2 = .02$) on total fixation duration on the AOIs. Also, no interaction effect between color and instruction on the total fixation duration on emotional AOIs or neutral AOIs factors was found ($p = .496$, $\eta_p^2 = .01$).

Gaze patterns were further investigated by performing a multivariate analysis of variance (MANOVA), with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and five individual AOIs (i.e., blood, face, eyes, wound, neutral AOIs) as dependent variables. This analysis revealed multivariate effects for color, $F(5, 107) = 2.70$, $p = .025$, $\eta_p^2 = .11$, and instruction on proportion of total fixation duration across AOIs, $F(5, 107) = 3.00$, $p = .014$, $\eta_p^2 = .12$. A significant univariate effect of color on proportion of total fixation duration was found for the wound AOI, $F(1, 114) = 4.64$, $p = .033$, $\eta_p^2 = .04$, and for the eyes AOI, $F(1, 114) = 3.95$, $p = .049$, $\eta_p^2 = .03$. In total, participants in the color condition fixated proportionally longer on the wound and eyes ($M_{wound} = 18\%$, $SD_{wound} = 9\%$; $M_{eyes} = 9\%$, $SD_{eyes} = 5\%$) than participants in the black and white condition ($M_{wound} = 15\%$, $SD_{wound} = 8\%$; $M_{eyes} = 7\%$, $SD_{eyes} = 4\%$). A significant univariate effect of instruction on proportion of total fixation duration was found for the blood AOI, $F(1, 114) = 10.29$, $p = .002$, $\eta_p^2 = .09$, and the face AOI, $F(1, 114) = 4.54$, $p = .035$, $\eta_p^2 = .04$. In total, participants in the watch condition fixated proportionally longer on the blood AOI ($M = 34\%$, $SD = 7\%$) than participants in the suppress condition ($M = 30\%$, $SD = 7\%$). In contrast, participants in the suppress condition fixated proportionally longer on the face AOI ($M = 34\%$, $SD = 5\%$) than participants in the watch condition ($M = 36\%$, $SD = 5\%$). In addition, a significant interaction effect of color and instruction on proportion of total fixation duration to the neutral AOIs was found, $F(1, 114) = 6.61$, $p = .011$, $\eta_p^2 = .06$. For participants in the suppress condition, watching the photographs in black and white ($M = 7\%$, $SD = 4\%$) led to a proportionally higher fixation duration than watching the photographs in color ($M = 4\%$, $SD = 3\%$), whereas participants in the watch condition had similar proportions of total fixation duration on the neutral AOIs when they watched the photographs in color ($M = 5\%$, $SD = 5\%$) or in black and white ($M = 4\%$, $SD = 3\%$). No significant interaction effects were found

for the other AOIs (p_{face} = .630, $\eta_p^2{}_{face}$ = .00; p_{eyes} = .455, $\eta_p^2{}_{eyes}$ = .01; p_{blood} = .337, $\eta_p^2{}_{blood}$ = .01; p_{wound} = .493, $\eta_p^2{}_{wound}$ = .00). Figure 2 depicts this interaction effect.

Number of fixations on emotional AOI versus control AOI

To investigate whether the color and instruction affected participants' number of fixations on the emotional AOIs and the neutral AOI, a multivariate analysis of variance (MANOVA), with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and emotional AOIs factor and neutral AOIs factor as dependent variables was conducted. Contrary to our hypotheses, this analysis yielded no significant main effects of color (p = .259, η_p^2 = .02), and instruction (p = .480, η_p^2 = .01) on the number of fixations on the AOIs. Also, no interaction effect between color and instruction on the number of fixations on emotional AOIs and neutral AOIs factors was found (p = .817, η_p^2 = .00).

Lastly, a multivariate analysis of variance (MANOVA), with color (color vs. black and white) and instruction (watch vs. suppress) as independent variables, and five individual AOIs (i.e., blood, face, eyes, wound, neutral AOIs) as dependent variables, revealed no significant main effects of color condition (p = .100, η_p^2 = .08), and instruction condition (p = .126, η_p^2 = .08) on the number of fixations on the AOIs. Also, no interaction effect between color and instruction on the number of fixations on the AOIs was found (p = .250, η_p^2 = .06).

Discussion

The present study investigated the role of gruesome visual evidence, individual differences in attentional control, and emotion suppression in moral judgment. Unfortunately we encountered a technical problem, and no results were obtained on attentional control. Contrary to our hypotheses and findings of our pilot study, results showed that participants responded with a

stronger emotional reaction to gruesome visual evidence in black and white than in color. Also, emotional reactions did not differ based on instruction (i.e., suppress emotions or watch freely). Unexpectedly, results of moral judgment demonstrated that the color of the gruesome visual evidence did not bias moral judgment, whereas participants who allowed emotions were more disapproving of the crimes than participants who suppressed their emotions. This is contrary to our hypothesis, which posed that emotion suppression would have a stronger biasing effect on moral judgments than allowing emotions. In other words, suppressing emotions did not lead to an ironic rebound effect, but successfully reduced bias in moral judgment.

In addition to these self-report measures of moral judgment, eye movements were recorded to investigate how participants looked at the emotional content of the gruesome visual evidence. Although analyses revealed no effects of color of the visual evidence (i.e., full color or black and white) or instruction (i.e., emotion suppression or watch freely) on fixations on the emotional AOIs group and neutral AOIs group, further inspection of the individual AOIs did reveal differences in gaze patterns. Participants who watched the gruesome visual evidence in black and white fixated more quickly on the wound of the victim, whereas participants who watched the gruesome visual evidence in color fixated longer on the wound and eyes of the victim. Also, participants who allowed emotions fixated longer on the blood, whereas participants who suppressed emotions fixated longer on the face of the victim. Most interestingly, an interaction was found between color and instruction, such that participants who suppressed emotions fixated longer on neutral objects in the photographs in black and white, whereas no differences were found for participants who allowed emotions.

In sum, the findings of the present study indicate that people look differently at gruesome visual evidence based on whether it is presented in color or in black and white, and whether

participants suppressed or allowed emotions. However, the findings unexpectedly challenge rather than support our hypotheses. In the subsequent section limitations of the study and alternative explanations for the findings will be discussed. We will conclude with suggestions for further research.

Limitations

Closer inspection of the materials offers an alternative explanation for the higher elicited disgust by the photographs in black and white. It may be that our conversion of the photographs from color to black and white made the photographs look even more realistic than they did in color. For instance, Vanderveen and Dillen (2013) noted that visual evidence is often copied multiple times and no longer legible. On the contrary, the black and white photographs used in our study were still of high quality, with a good resolution and a minimal amount of noise. In particular, some participants mentioned that the photographs were obviously staged, since the eyes of the actors revealed that they were still alive. This is illustrated by the fact that participants who watched the photographs in color fixated longer on the eyes of the victim. It may be that the eyes of the victims looked strange especially in the photographs in color, and therefore drew more attention (Becker, Pashler & Lubin, 2007), whereas the eyes of the actors looked less lively in the black and white photographs. Perhaps the conversion to black and white concealed that the photographs were put in scene, while at the same time retaining details and visual information, making them more gruesome than the full-color versions. Nevertheless, it remains unexpected that the photographs in black and white received higher disgust ratings than the full-color versions, as it not only refutes our hypothesis, but also contradicts the findings of our pilot study. Further research is warranted on whether the crime scenes are considered to be realistic, and

whether participants' disgust ratings are influenced by the degree of authenticity of the visual evidence.

In addition, participants reported different emotional responses to only the gruesome visual evidence of case 1; the male victim. Although we paid special attention to the comparability of the cases, participants reported similar emotional responses to the full color and black and white version of the gruesome visual evidence of case 2; the female victim. A study of Felson and Feld (2009) demonstrated that people were more disapproving of men's assaults on women than violence involving other gender combinations. Indeed, additional analyses showed an effect of case (see appendix C), such that whereas participants were more disapproving of case 1 in black and white than in color, disapproval ratings rose to an equal level for case 2. This change in disapproval ratings can be explained by the specifics of the case report. The case report states that the female victim was 'presumably attacked in the kitchen and laid in bed by her attacker'. Firstly, although not explicitly stated, the fact that the offender was able to move the victim implies that the offender was physically strong and may have led participants to think the offender was a man. Secondly, research of Horberg, Oveis, Keltner, and Cohen (2009) demonstrated that violations of purity norms (e.g., sexual violence) are often judged to be more morally wrong than, for example, harm violations (e.g., physical harm). Due to the statement that the victim was laid in bed, and the lack of further context, participants may have inferred that the attack also included sexual violence, and may have assigned more weight to the severity of the crime. Consequently, it may be that the content of the case report influenced the results of the experiment, such that disapproval ratings were inflated for the second case. As the black and white photographs were already perceived to be more disgusting than the full-color versions, it

may be that disapproval ratings were not inflated for the photographs in black and white due to a ceiling effect.

Contradictory results were found for the measures of moral judgment. Whereas the crime evaluation measure indicated that participants who allowed emotions were more disapproving of the crimes than participants who suppressed their emotions, no differences between conditions were found on the unconditional prison sentence measure. This is noteworthy as these measures were intended to measure the same construct. A potential explanation for the lack of effect on the unconditional prison sentence measure could be that, individual variation impacted the assigned prison sentences. For instance, it is unclear whether knowledge of Dutch law was evenly distributed across conditions, and no information is available on the extent to which participants guessed what would be an appropriate prison sentence, yielding the results unreliable. Moreover, without sentencing guidelines, it may be that personal beliefs about prison sentences led to additional variation. Whereas some people believe murder should always be punished with a life sentence, others may believe a lighter sentence is justified. Further research should include a measure of knowledge of prison sentences in the context of criminal justice in the Netherlands, and a measure of personal beliefs. If participants are likely to have little knowledge of Dutch law, a slider question could limit the range of the prison sentences, while avoiding explicit sentencing guidelines.

The results of the eye movement measures showed that conditions did not differ in fixations on the emotional AOIs group and neutral AOIs group. Nevertheless, the findings on the individual AOIs provide valuable information on how participants looked at the gruesome visual evidence. It may be that the current taxonomy of emotionally charged AOIs is not fully correct. For instance, previous research (e.g., Alpers, 2008; Calvo & Lang, 2005; Kissler & Keil, 2008)

demonstrated that people tend to fixate more quickly and longer on emotional aspects of visual stimuli than on neutral aspects of visual stimuli. One could speculate that, since the present study showed that all participants fixated on the wound AOI either more quickly (i.e., in black and white) or longer (i.e., in color), the wound could be the most gruesome and emotional aspect of the visual evidence used in the present study. However, it is still unclear which AOIs are perceived as gruesome or emotionally charged, and further research is needed in order to improve the taxonomy of the emotional AOIs.

The present work is the first to investigate the role of features of visual evidence and emotion suppression in moral judgment. Further research is needed to validate and improve the materials used in the present study, and to further investigate the research questions. For example, a study with a within-subjects design or a mixed design, in which the materials are counterbalanced, could be used to further investigate the role of color of the visual evidence. Especially, the newly created black and white versions of the visual evidence warrant further study, as it remains unclear whether the photographs are considered to be realistic, and whether the photographs resemble the copies currently used in criminal trials in the Netherlands (see Vanderveen & Dillen, 2013, for an example). Also, it is recommended to include neutral visual evidence in future studies to more precisely determine the extent to which participants think the visual evidence is gruesome and disgusting. In addition, to verify or refute the results of the present research further studies investigating the research question are needed, especially to explore whether the findings hold in more dynamic environments, such as a criminal trial. Experiments can be useful to investigate the current topic within a controlled setting. However, since criminal justice cases take place in less controlled and dynamic environments, field studies would be an indispensable addition to experimental research. Lastly, since we were unable to

obtain results on individual differences in attentional control, it is especially of interest to see whether variations in attentional control influence the impact of disgust on moral judgments as we initially predicted. For instance, if certain individuals (i.e., with low attentional control) are indeed more susceptible to bias in moral judgment, interventions aimed at reducing this bias may be developed specifically targeted at those individuals.

Conclusion

To conclude, the present study suggests that gruesome visual evidence may have unintended effects on how people evaluate crimes. People perceive gruesome visual evidence differently based on whether it is presented in color or in black and white, and emotions elicited by gruesome visual evidence can bias moral judgment. However, people seem able to successfully reduce bias in their moral judgment by suppressing their emotions. Although the use of visual evidence during criminal trials has potential advantages, further research is needed to determine the conditions under which the criminal justice system can use visual evidence while remaining free of bias.

Notes

[1] Two participants accidentally skipped the independent variable, three participants did not understand the eye-tracking task, one participant was blind on one eye, and one participant recognized the female actor.

[2] Since Stroop performance may be affected by color-blindness (Van Boxtel et al., 2001), the Ishihara color plate test (Ishihara, 1994) was administered prior to the Stroop task. All participants had normal color vision.

[3] Case 1: FO22486, FO22487. Case 2: FO22514, FO22515.

References

Abramowitz, J. S., Tolin, D. F., & Street, G. P. (2001). Paradoxical effects of thought suppression: A meta-analysis of controlled studies. *Clinical Psychology Review*, *21*, 683–703.

Açik, A., Onat, S., Schumann, F., Einhäuser, W., & König, P. (2009). Effects of luminance contrast and its modifications on fixation behavior during free viewing of images from different categories. *Vision Research*, *49*, 1541–1553.

Alpers, G. W. (2008). Eye-catching: Right hemisphere attentional bias for emotional pictures. *Laterality*, *13*, 158–178.

Bradley, M. M. (2009). Natural selective attention: Orienting and emotion. *Psychophysiology*, *46*, 1–11.

Becker, M. W., Pashler, H., & Lubin, J. (2007). Object-intrinsic oddities draw early saccades. *Journal of Experimental Psychology: Human Perception and Performance*, *33*, 20–30.

Blechert, J., Sheppes, G., Di Tella, C., Williams, H., & Gross, J. J. (2012). See what you think reappraisal modulates behavioral and neural responses to social stimuli. *Psychological Science*, *23*, 346–353.

Bright, D. A., & Goodman-Delahunty, J. (2011). Mock juror decision making in a civil negligence trial: The impact of gruesome evidence, injury severity, and information processing route. *Psychiatry, Psychology and Law*, *18*, 439–459.

Bornstein, B. H. (1998). From compassion to compensation: The effect of injury severity on mock jurors' liability judgments. *Journal of Applied Social Psychology*, *28*, 1477–1502.

Butler, S., Gilchrist, I. D., Burt, D. M., Perrett, D. I., Jones, E., & Harvey, M. (2005). Are the perceptual biases found in chimeric face processing reflected in eye-movement patterns?. *Neuropsychologia*, *43*, 52–59.

Calvo, M. G., & Lang, P. J. (2004). Gaze patterns when looking at emotional pictures: Motivationally biased attention. *Motivation and Emotion*, *28*, 221–243.

Calvo, M. G., & Lang, P. J. (2005). Parafoveal semantic processing of emotional visual scenes. *Journal of Experimental Psychology: Human Perception and Performance*, *31*, 502–519.

Capestany, B. H., & Harris, L. T. (2014). Disgust and biological descriptions bias logical reasoning during legal decision-making. *Social Neuroscience, 9*, 265–277.

Chapman, H. A., & Anderson, A. K. (2013). Things rank and gross in nature: A review and synthesis of moral disgust. *Psychological Bulletin, 139*, 300–327.

Corbetta, M. (1998). Frontoparietal cortical networks for directing attention and the eye to visual locations: Identical, independent, or overlapping neural systems?. *Proceedings of the National Academy of Sciences, 95*, 831–838.

Darby, R. S., & Harris, C. R. (2010). Embarrassment's effect on facial processing. *Cognition and Emotion, 24*, 1250 – 1258.

Deubel, H., & Schneider, W. X. (1996). Saccade target selection and object recognition: Evidence for a common attentional mechanism. *Vision Research, 36*, 1827–1837.

Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology, 111*, 225–236.

Douglas, K. S., Lyon, D. R., & Ogloff, J. R. P. (1997). 'The impact of graphic photographic evidence on mock jurors' decisions in a murder trial: Probative or prejudicial?'. *Law and Human Behavior, 21*, 485–501.

Dubelaar, M. J., & Vanderveen, G. N. G. (2009). Beeld en geluid in het strafproces; implicaties van de opkomst van (audio) visuele technieken en materialen voor communicatie en besluitvorming in de strafrechtspraktijk. *Nederlands Juristenblad, 84*, 7-16.

Duchowski, A. (2007). *Eye tracking methodology: Theory and practice*. Springer – Verlag, London, UK.

Eisenbarth, H., & Alpers, G. W. (2011). Happy mouth and sad eyes: scanning emotional facial expressions. *Emotion*, *11*, 860–865.

Fagan Jr, J. F. (1993). Smile. How Prejudicial Can the Candid Camera Be? The Admission of Photographs in a Criminal Trial. *Journal of Civil Rights and Economic Development*, *9*, 145–161.

Fecteau, J. H., & Munoz, D. P. (2006). Salience, relevance, and firing: a priority map for target selection. *Trends in Cognitive Sciences*, *10*, 382–390.

Fennis, B. M., & Janssen, L. (2010). Mindlessness revisited: Sequential request techniques foster compliance by draining self-control resources. *Current Psychology*, *29*, 235–246.

Felson, R. B., & Feld, S. L. (2009). When a man hits a woman: Moral evaluations and reporting violence to the police. *Aggressive Behavior*, *35*, 477-488.

Fowle, K., & Schofield, D. (2011). Visualising forensic data: Investigation to court.

Greene, E., & Bornstein, B. (2000). Precious little guidance: Jury instruction on damage awards. *Psychology, Public Policy, and Law*, *6*, 743–768.

Gyurak, A., & Ayduk, Ö. (2007). Defensive Physiological Reactions to Rejection The Effect of Self-Esteem and Attentional Control on Startle Responses. *Psychological Science*, *18*, 886–892.

Haidt, J. (2001). The emotional dog and its rational tail: a social intuitionist approach to moral judgment. *Psychological Review, 108*, 814–834.

Haidt, J., McCauley, C., & Rozin, P. (1994). Individual differences in sensitivity to disgust: A scale sampling seven domains of disgust elicitors. *Personality and Individual Differences*, *16*, 701–713.

Hoffman, J. E., & Subramaniam, B. (1995). The role of visual attention in saccadic eye movements. *Perception & Psychophysics*, *57*, 787–795.

Horberg, E. J., Oveis, C., Keltner, D., & Cohen, A. B. (2009). Disgust and the moralization of purity. *Journal of personality and social psychology*, *97*, 963-976.

Ishihara, S. (1994). *Ishihara's tests for colour-blindness* (38 plates ed.). Tokyo: Kanehara Shuppan Co.

Kant, I. (1785/1998). *Groundwork for the metaphysics of morals.* New York: Cambridge University Press.

Kampen, M., de Keijser, J., & Schoep, A. (2013). Het effect van de slachtofferverklaring op straftoemeting: een experimenteel onderzoek onder rechtenstudenten. *Tijdschrift voor Criminologie*, *55*, 24–43.

Kissler, J., & Keil, A. (2008). Look–don't look! How emotional pictures affect pro-and anti-saccades. *Experimental Brain Research*, *188*, 215–222.

Leader, T., Mullen, B., & Abrams, D. (2007). Without mercy: The immediate impact of group size on lynch mob atrocity. *Personality and Social Psychology Bulletin*, *33*, 1340–1352.

Milham, M. P., Erickson, K. I., Banich, M. T., Kramer, A. F., Webb, A., Wszalek, T., & Cohen, N. J. (2002). Attentional control in the aging brain: insights from an fMRI study of the Stroop task. *Brain and Cognition*, *49*, 277–296.

Nummenmaa, L., Hyönä, J., & Calvo, M. G. (2006). Eye movement assessment of selective attentional capture by emotional pictures. *Emotion*, *6*, 257–268.

Olatunji, B. O., Williams, N. L., Tolin, D. F., Abramowitz, J. S., Sawchuk, C. N., Lohr, J. M., & Elwood, L. S. (2007). The Disgust Scale: item analysis, factor structure, and suggestions for refinement. *Psychological Assessment*, *19*, 281–297.

Oliver, E., & Griffitt, W. (1976). Emotional arousal and 'objective' judgment. *Bulletin of the Psychonomic Society*, *8*, 399–400.

Olsen, A. (2012). The tobii i-vt fixation filter. *Tobii Technology*.

Openbaar Ministerie (2011, April 14). *Eerste digitale hoger beroepszitting Den Haag met mobiel OM-dossier op iPad* [Press release]. Retrieved from https://www.om.nl/vaste-onderdelen/zoeken/@29279/eerste-digitale

Parkhurst, D. J., & Niebur, E. (2003). Scene content selected by active vision. *Spatial Vision*, *16*, 125–154.

Peers, P. V., & Lawrence, A. D. (2009). Attentional control of emotional distraction in rapid serial visual presentation. *Emotion*, *9*, 140–145.

Pizarro, D. (2000). Nothing more than feelings? The role of emotions in moral judgment. *Journal for the Theory of Social Behaviour*, *30*, 355–375.

Pizarro, D., Inbar, Y., & Helion, C. (2011). On disgust and moral judgment. *Emotion Review*, *3*, 267–268.

Ramanathan, S., Katti, H., Sebe, N., Kankanhalli, M., & Chua, T. S. (2010). An eye fixation database for saliency detection in images. *Computer Vision–ECCV 2010*, 30–43.

Reinagel, P., & Zador, A. M. (1999). Natural scene statistics at the centre of gaze. *Network: Computation in Neural Systems*, *10*, 341–350.

Roelofs, A. (2003). Goal-referenced selection of verbal action: modeling attentional control in the Stroop task. *Psychological review*, *110*, 88–125.

Schnall, S., Haidt, J., Clore, G. L., & Jordan, A. H. (2008). Disgust as embodied moral judgment. *Personality and Social Psychology Bulletin, 34,* 1096–1109.

Schofield, D. (2009). Animating evidence: Computer game technology in the courtroom. *Journal of Information, Law and Technology, 1,* 1–21.

Sherwin, R. K. (2007). Law in the Age of Images. *Visual Literacy in Action*, 179-194.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 121,* 15–23.

Van Boxtel, M. P. J., Ten Tusscher, M. P. M., Metsemakers, J. F. M., Willems, B., & Jolles, J. (2001). Visual determinants of reduced performance on the Stroop color-word test in normal aging individuals. *Journal of Clinical and Experimental Neuropsychology*, *23,* 620–627.

Van Dillen, L. F., van der Wal, R. C., & van den Bos, K. (2012). On the Role of Attention and Emotion in Morality Attentional Control Modulates Unrelated Disgust in Moral Judgments. *Personality and Social Psychology Bulletin*, *38*, 1222–1231.

Vanderveen, G. N. G. (2011). Beeldmateriaal in de Nederlandse strafrechtsketen. *Visuele technieken in opsporing en rechtspraak*, 37, 10–28.

Vanderveen G. N. G., & Van Dillen L. F. (2013). Digitalisering maakt strafrechtspraktijk kleurig. Met alle onbekende gevolgen van dien, *Proces, Tijdschrift voor berechting en reclassering*, *92*, 315–317.

Wegner, D. M. (1992). You can't always think what you want: Problems in the suppression of unwanted thoughts. *Advances in Experimental Social Psychology*, *25*, 193–225.

Wegner, D. M., & Erber, R. (1992). The hyperaccessibility of suppressed thoughts. *Journal of Personality and Social Psychology, 63*, 903–912.

Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology, 51*, 59–91.

Whalen, D.H. & Blanchard, F.A. (1982). Effects of photographic evidence on mock juror judgment. *Journal of Applied Social Psychology, 1,* 30–41.

Wieser, M. J., Pauli, P., Alpers, G. W., & Mühlberger, A. (2009). Is eye to eye contact really threatening and avoided in social anxiety? An eye-tracking and psychophysiology study. *Journal of Anxiety Disorders, 23*, 93–103.

Table 1. Overview of self-reported disgust ratings of visual evidence (Mean, SE) for color condition (color vs. black and white) and instruction condition (watch vs. suppress emotions) per photo.

	Disgust ratings of the visual evidence							
	Photo 1		Photo 2		Photo 3		Photo 4	
Condition	Color	BW	Color	BW	Color	BW	Color	BW
Watch	3.49_{a} (1.14)	4.06_{b} (1.26)	4.06_{a} (1.35)	4.59_{b} (1.34)	3.62_{ab} (1.27)	3.64_{ab} (1.29)	4.78_{ab} (1.45)	4.91_{ab} (1.35)
N	37	33	37	33	37	33	37	33
Suppress	3.44_{a} (1.05)	3.95_{b} (1.09)	3.84_{a} (1.22)	4.47_{b} (1.24)	3.62_{ab} (1.30)	3.73_{ab} (1.52)	4.68_{ab} (1.34)	5.01_{ab} (1.35)
N	36	35	36	35	36	35	36	35

Note: BW = black and white. Standard deviations appear in parentheses. Means with differing subscripts are significantly different at $p < .05$. Disgust ratings ranged from 1 (*not at all*) to 7 (*extremely*).

Table 2. Mean and standard error of crime evaluation for color condition (color vs. black and white) and instruction condition (watch vs. suppress emotions) per case (case 1 = photo 1 and 2, case 2 = photo 3 and 4).

	Severity						Prison sentence					
	Case 1		Case 2		Total		Case 1		Case 2		Total	
Condition	Color	BW	Color	BW	Color	BW	Color	BW	Color	BW	Color	BW
Watch	5.90	5.80	6.27	5.95	6.09_a	5.87_a	13.44	12.08	14.08	12.31	13.80_c	12.20_c
	(0.75)	(0.79)	(0.61)	(0.77)	(0.65)	(0.76)	(8.08)	(7.41)	(7.78)	(7.91)	(7.85)	(7.57)
N	37	33	37	33	37	33	37	33	37	33	37	33
Suppress	5.40	5.53	5.91	5.86	5.65_b	5.69_b	13.25	14.17	14.71	15.44	13.98_c	14.81_c
	(0.75)	(0.74)	(0.67)	(0.73)	(0.68)	(0.71)	(9.41)	(12.36)	(10.13)	(12.38)	(9.62)	(12.32)
N	36	35	36	35	36	35	36	35	36	35	36	35

Note: BW = black and white. Standard deviations appear in parentheses below the means. Means with differing subscripts are significantly different at $p < .05$. Severity ratings ranged from 1 (*not at all*) to 7 (*extremely*), and prison sentence ranged from 0.75 years to 58.33 years.

Case 1

Case 2

Figure 1. Overview of Areas of Interest (AOIs) per case, each AOI is depicted in a different color; blood AOI in red, wound AOI in green, face AOI in yellow, eyes in purple, neutral AOI in blue.

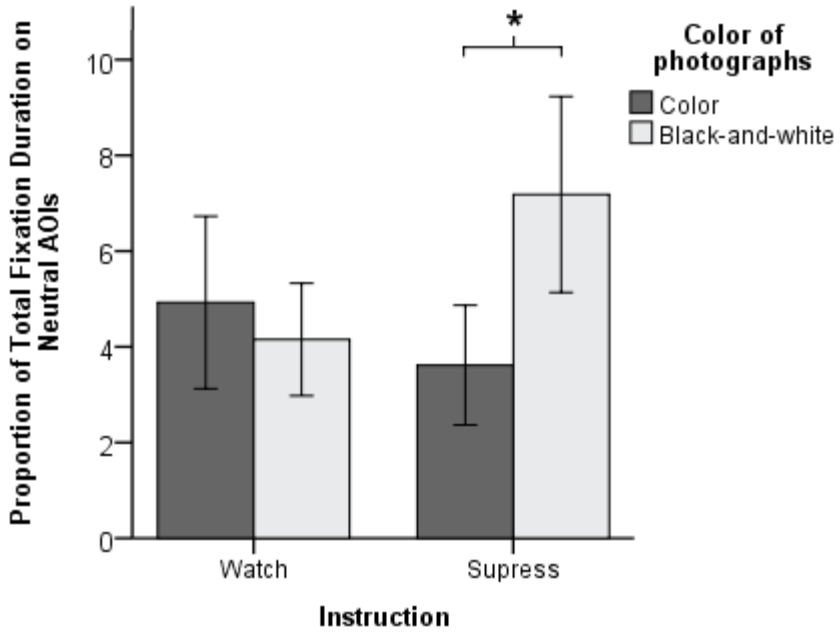

Figure 2. Graph depicting the interaction effect of color condition and instruction condition on the proportion of total fixation duration for the neutral Area of Interests (AOIs; in percentages). Participants who suppressed their emotions fixated proportionally longer on the neutral objects when they viewed photographs in black and white compared to when they viewed the photographs in color. Participants who watched freely had similar proportions of fixation duration on the neutral objects for colorful and black and white photographs. Error bars represent a 95% CI. * $p < .05$.

Appendix A: Short police reports.

Case 1

"On Monday morning the police department of Leiden received an anonymous tip stating that someone got wounded at the Moddermanstraat in Leiden. At arrival the police found the moral remains of a 44-year old male. The forensic investigation team was activated immediately. The victim has probably been killed by a misdemeanor. At the crime scene it can be established, with reasonable suspicion, that the victim was killed by a gunshot wound, however no firearm was found. The forensic investigators did the usual forensic research and took the following photographs".

Case 2

"On Saturday afternoon, the police received a report of a 21-year old student in Amsterdam. When she got home, she found her roommate lifeless in bed. Once arrived at the scene, it turned out to be the remains of a 22-year old female. Forensic investigators were enabled. There is a very strong presumption that the victim was killed by a misdemeanor. Presumably she was attacked in the kitchen, after which she was laid in bed by her attacker. The forensic investigators did the usual forensic research and took the following photographs".

Appendix B: Crime evaluation measure 'Severity of the crime'.

Items	Scaling *1 = Strongly disagree, 7 = Strongly agree*						
1. I feel bad about what happened to the victim.	1	2	3	4	5	6	7
2. The offender should be prosecuted for what he has done.	1	2	3	4	5	6	7
3. I feel sympathy for the victim.	1	2	3	4	5	6	7
4. I think this offense is serious.	1	2	3	4	5	6	7
5. The behavior of the offender is morally objectionable.	1	2	3	4	5	6	7
6. I think the injuries of the victim are serious.	1	2	3	4	5	6	7

Appendix C: Supplementary analyses.

A repeated measures ANOVA was conducted to investigate whether there was an effect of case on participants' disapproval ratings. The analysis revealed a significant main effect of case on disapproval ratings, $F(1, 137) = 23.67$, $p < .001$, $\eta_p^2 = .15$, and a significant interaction effect of case and color condition on disapproval ratings, $F(1, 137) = 14.41$, $p < .001$, $\eta_p^2 = .10$. Participants were more disapproving of case 1 in black and white ($M = 4.26$, $SD = 1.18$) than in color ($M = 3.71$, $SD = 1.15$), and disapproval ratings rose to an equal level for case 2 ($M_{black\ and\ white} = 4.33$, $SD = 1.28$; $M_{color} = 4.17$, $SD_{color} = 1.28$).