PERCEPTUAL DEHUMANIZATION

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Phil, I constantly feel struck by the serendipity of you coming to Penn. The first time I read Jen Lerner's "Fear, Anger and Risk", I was certain that I wanted to pursue a career in social psychology. I fell in love with the clarity, rigor, and flexibility of social functionalism and it made all my doubts about social psychology seem unimportant. Although I didn't know Jen was using social functionalism (or have any knowledge of the term), I desperately wanted to take "her" theoretical perspective and apply it to cognitive processes. My early ideas on how to pursue this structural-functionalist marriage were atrocious and I dropped my functionalist ambitions. Then you came to Penn and I got guidance on how to theorize "like Jen", from the person who taught her. I was unexpectedly given the opportunity to pursue my passion with the person best equipped to help me do so. I cannot describe how lucky that makes me feel.

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ABSTRACT

PERCEPTUAL DEHUMANIZATION

Katrina M. Fincher

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The results of eighteen studies support the hypothesis that the holistic processing of faces is attenuated by social facts in a manner that serves the formation of cooperative, non-kin based communities. The first chapter establishes the phenomenon of Perceptual Dehumanization through demonstrating a functional link between face processing and social behavior. A multi-method array of social and perceptual techniques suggests that the holistic processing of faces is inhibited upon learning someone is a norm violator and that this inhibition of holistic processing facilitates punishment. The second chapter determines the social function of Perceptual Dehumanization. It combines past theoretical accounts of dehumanization with modern work on perceptual categorization to propose that perceptual dehumanization functions to produce indifference towards harm (as opposed to facilitating the active or passive infliction of harm). This thesis is supported by results from multiple methods, which indicate that the holistic processing of faces is inhibited for high status civil servant. Consistently, these inhibitions in holistic processing facilitate the sacrifice of these civil servants for the greater good. The third chapter establishes the cognitive mechanism through which the attenuation of holistic processing occurs. Results from both eye-tracking and exogenous manipulations of attention suggest that Perceptual Dehumanization occurs due to a shift in the gaze pattern that causes both changes in perceptual processing and social behavior. This program of research emphasizes the interdependency between human's ability to identify faces (i.e. engage in holistic processing) and human's ability to forge longstanding non-kin cooperative bonds; it suggests face perception is an inherently social process. More broadly it suggests combing social functionalism and cognitive structuralism may be a fruitful avenue for future research.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

PREFACE

Exploring the Consequences, Function and Mechanism of Perceptual Dehumanization

As in other species, the social world of our ancestors contained individuals who were poised to exploit others if such acts were self-beneficial (Daly & Wilson, 1988; Duntley, 2005; Duntley & Buss, 2004). This tendency for exploitation brings with it the tendency for exploitation to engender a retaliatory response. This suggests that human behavior requires the capacity for unfeeling and brutish behavior. However, unlike most other species, human societies rely upon large-scale cooperation among genetically unrelated individuals (Boyd & Richardson, 1996; Hrushka, 2010). This suggests that human behavior also requires the capacity for kind and benevolent behavior (Eisenberg & Miller, 1987).

A diverse body of work has provided a multidimensional understanding of the evolutionary dilemma posed by cooperation. Work from computational modeling suggests that forgiving, but intermittently punitive strategies are optimal for facilitating cooperation and avoiding the echo-effect in noisy environments (Axelrod & Hamilton, 1981; Nowak, 2006). Social network analysis suggests that homophily provides a mechanism for individuals to avoid exploitation (Fowler & Christakis, 2010; Apicella, Marlowe, Fowler & Christakis, 2012). Economists have highlighted the importance of third party punishment and evolutionary psychologist suggested cognitive modules such as cheater detection enable such interdependence among humans (Fehr & Gachter, 2000; Cosmides & Tooby, 1992).

While each of these approaches provides unique explanatory power, they do not resolve the intrapsychic conflict these two forms of motivation suggest. The contradictory motivational forces cooperative equilibrium requires, imply a psyche that can switch readily between kind and cooperative behavior and aggressive potentially callous behavior. How is a species with kind and cooperative tendencies able to act in an aggressive and callous manner without arousing dissonance or remorse? This dissertation leverages perceptual and social psychology to argue that changes in perceptual processes facilitate a cooperative social order.

As a social and interdependent species, faces are among the most important visual stimuli humans perceive. Faces inform a person's identity, mood, sex, age and direction of gaze (which connotes intentions and desires) (Haxby, Hoffman & Gobbini, 2000). Perhaps most importantly, facial recognition enables humans to identify an enormous number of individuals within a fraction of a second of viewing their face (Moscovitch, Winocur, & Behrmann, 1997; Haxby, Hoffman & Gobbini, 2000, 2002). The ability to identify faces allows humans to ascribe discrete identities to actors. Importantly, this ability enables individuals to discern cooperators and defectors in repeated social interactions. Moreover, assigning discrete identities to actors enables individuals to assign social reputations to actors; reputational consequences produce substantial incentives to cooperate as they dramatically increase the consequences of defection (Milinski, Semmann, & Krambeck, 2002; Nowak, 2006; Fu, Hauert, Nowak & Wang, 2008). The links between face recognition and identity, and identity and cooperation suggest a deep connection between face perception and cooperation.

Given the importance of faces in human's social environment, it is perhaps not surprising that humans are very skilled at face recognition. There is a large body of evidence which suggests that face and object recognition involve qualitatively different processes—with faces eliciting more configural or holistic processing and objects more analytical or attribute-based processing (Farah, Levinson, Klien, 1995; Richler, Cheung, & Gauthier, 2011; Kanwisher, Tong, & Nakayama, 1998; Tarr, & Gauthier, 2000; Farah, Wilson, Drain, & Tanaka, 1995; Avidan, Tanzer, & Behrmann, 2011). Furthermore, face perception, or holistic processing more generally, requires a large amount of dedicated neural tissue-- which notably represents more cortical tissue than the many other encapsulated modules such as the language system (Kanwisher, 2000).

The social importance of faces is frequently used in support of face-specific processing – or the notion that humans have evolved to have a cognitive module which is dedicated to face specific processing (Haxby, Hoffman & Gobbini, 2000; Kanwisher & Yovel, 2006). However, if face perception evolved to serve social goals, there is little reason to believe face specific processing occurs independently from selection pressures in the social world. Consistently,

recent work suggests social processes may impact face perception (e.g. MacLin & Malpass, 2001, 2003).

This emerging body of work suggests that there are a numerous instances where social information leads to attenuations in the holistic (face typical) processing of faces (Kelly, Quinn, Slater, Lee, Ge & Pascalis, 2007; Michel, Rossion, Han, Chung, & Caldara, 2006; Van Bavel, Packer, Cunningham, 2011). In this research thus far there has been a tight link between the groups that are dehumanized perceptually (an attenuation of the perceptual processes associated with humans) and those that are dehumanized socially (attenuation of compassion associated with the treatment of other humans). This work has focused on the perceptual mechanisms underlying these changes in processing – indeed, strong convergent evidence suggest an attenuation of *holistic* processing.

There is a long history, beginning with the "new look," (Bruner, 1957), which suggests social processes can alter perceptual ones. In the domain of face processing, change may have deep functional significance since the holistic processing of a face is the perceptual categorization of an individual as human. Therefore changes in processing represent a denial of the perceptual markers of humanity—a perceptual dehumanization.

As with work on dehumanization, which has adapted a deeply functionalist perspective (e.g. Bandura, 1999; Haslam, 2006; Kelman, 1973; Optow, 1990), we suggest that this change in perception facilitates social goals. In the current work, we explore attenuation in (putatively) face-specific processing from a social functionalist perspective—we ask how the attenuation of face processing facilitates human social life. More concretely, how it allows individuals to thrive in collectivities regulated by complex accountability relationships, norms, and values.

In this dissertation we explore *if* (Chapter 1), *why* (Chapter 2), and *how* (Chapter 3) attenuations in the holistic processing of faces serve the social factors that enable humans to form cooperative communities. We focus this exploration around the following key questions: (1) *Does* a functionalist relationship between face-processing and social goals exist? Does the attenuation in holistic processing both spontaneously occur and facilitate socially adaptive

behavior? (2) *Why* do these changes in processing occur? What is the broader social function of attenuations in face-processing? (3) *How* do these changes in processing occur? What is the cognitive-perceptual mechanism underlying attenuations in face-processing?

Chapter 1 Overview

The first chapter aims to establish a functionalist relationship between face-processing and social goals and behavior. Face processes need to interact with social behavior in two regards to establish a functionalist relationship exist: (1) social information needs to bring about changes in face processing; (2) changes in face processing need to facilitate socially relevant behavior.

We establish a bidirectional relationship between facial processing and social information using norm violators. We build a theory of perceptual dehumanization, which proposes that individuals do not perceive the targets of retributivist wrath as fully human. We demonstrate that knowledge that an individual is a norm violator leads to attenuation in face-typical processing which, in turn, influences punitive behavior.

Norm violators provide an interesting avenue for exploring face-processing effects because punishment is a common although curious behavioral response. While people are predisposed to punish norm violators and perhaps even derive positive utility from this behavior (Fehr & Fischbacher, 2004), punishment results in the suffering of defenseless fellow human beings. Given the high frequency of prosocial behavior observed among humans (Lowenstien & Small, 2007), it is striking that humans so frequently engage in behavior that, were it not collectively sanctioned, would be regarded as profoundly anti-social. Punishment therefore strikingly highlights the question: What mental mechanisms make it possible for people to become indifferent to, or even enjoy, the suffering of a fellow human being?

Although there are many domains in which individuals are surprisingly indifferent to the suffering of others, punishment provides a particularly useful avenue for exploring the theory of perceptual dehumanization. First, unlike racial discrimination or ethnic genocide, when exploring the punitive response, facial stimuli can be randomly paired to social categories. As a result, one

can definitively conclude that perceptual effects are driven by the social information and not by properties of the stimulus. Secondly, a large body of research has developed clear tools for measuring punitive attitudes (e.g. Carlsmith, Darley, & Robinson, 2001; McKee, I. R., & Feather, 2008).

Finally, it is possible to measure punitive response directly. Unlike work on racial attitudes, which suggest a high degree of casuistry (Norton, Vandello & Darley, 2004), harming norm violators is relatively socially acceptable (Cohen, 2012; Tyler, 1996). Given that it is unclear if perceptual dehumanization functions implicitly or explicitly, it is important to examine if these effects occur in a domain with relatively high correspondence between implicit and explicit attitudes.

Chapter 1 uses seven studies to test the functionalist relationship between punishment and facial processing. Studies 1 through 5 use a multi-method array of techniques to address the question: do people process the faces of norm violators differently from those of others? These studies serve to establish convergent validity that the impairment in facial processing is due to an attenuation of holistic processing and that impairment in processing is specifically elicited by norm violators and not secondary features of the action.

Studies 6 and 7 test the functionalist claim that an attenuation of holistic processing facilitates punitive behavior. Using multiple methods of impairment, Study 6 examines if featural processing makes it easier to punish norm violators. Finally, Study 7 establishes a link between a common punitive practices and the impairment of holistic processing.

Chapter 2 Overview

The second chapter aims to establish the social function of attenuations in the holistic processing of faces. It links the emerging body of work suggesting a perceptual denial of humanness to classic functionalist arguments on dehumanization.

Classic accounts of dehumanization suggest that it functions to facilitate violence. This research argues that dehumanization allows moral self-sanctions to be disengaged by no longer viewing the target of dehumanization as persons with feelings, hopes and concerns but as a sub-

human objects (Kelman, 1976; Optow, 1990; Bandura, 1999, 2002). Dehumanization therefore occurs in situations where the target is stigmatized or otherwise viewed as inferior.

However, the attenuation of face-typical processing appears to occur in a broad range of circumstances, which do not necessarily involve the disengagement of classic moral rules. For example, the attenuation of face specific processing occurs in benign circumstances, such as minimal groups (Bernstein, Young & Hugenberg, 2007). Because perceptual dehumanization also occurs in situations where there is little motivation to harm, this suggest perceptual dehumanization may act to inhibit helping behavior rather than facilitate harm.

Distinguishing between these two possibilities is difficult because from most evolutionary, economic or social evaluative perspectives, the individuals whom people do not help are those of low value and low competence. However, there are instances when these two possibilities can be disambiguated. If our theoretical claim is correct, there are various group level situations, such as war, in which helping is socially detrimental. To protect in-group members and their interests, people must sometimes override concern and deny honored civil servants the concern due to ordinary people.

Chapter 2 uses six studies to test this claim. Studies 1 through 4 use a multi-method array of techniques to test the breath of dehumanization. These studies suggest that individuals spontaneously attenuate perceptual processing of both norm violators and honored civil servants in high-risk roles. Furthermore, if the theory of Perceptual Dehumanization applies in these cases, participants should not only show an attenuation of face typical processing but the change in processing should facilitate utilitarian behavior. In the case of high-status but potentially sacrificial actors, perceptual dehumanization should make sacrifices easier. Using multiple methods of impairment, studies 5 and 6 examines if featural processing makes it easier to act in line with the greater social interest.

Chapter 3 Overview

The third chapter examines what is the cognitive-perceptual mechanism underlying attenuation in face processing. The attenuation of face specific processing is surprising because

it is inconsistent with well-established modularity based accounts of face-perception, which suggest that higher-order factors, such as social information, should not influence perception. Therefore work on perceptual dehumanization raises the question: how are these face-specific effects attenuated?

It has been well established that social factors (e.g. emotion) can influence attentional scope, attentional capture and the target of attention (Rowe, Hisch & Anderson, 2007; Öhman, A., Flykt, A., & Esteves, 2001) and that attention can modulate the transmission of information during the early stages of sensoriperceptual analysis (e.g. Hillyard, Vogel, & Luck, 1998). Therefore, it is possible that perceptual changes are instantiated through altering the manner in which individuals attend to faces.

Chapter 3 relies upon five studies to examine if changes in visual attention drive perceptual dehumanization. Study 1 uses eye tracking to examine changes in visual attention. Studies 2-4 tests if exogenously manipulating attentional focus can diminish the effect of social information on face processing. Finally, study 5 examines if visual attention towards faces, effects behavior.

CHAPTER 1

Perceptual Dehumanization of Faces Is Activated by Norm Violations and Facilitates Norm Enforcement

On 1 March 1757 Damiens the regicide was condemned "to make the amende honorable […] the flesh will be torn from his breasts, arms, thighs and calves with red-hot pincers, his right hand, holding the knife with which he committed the said parricide, burnt with sulphur, and, on those places where the flesh will be torn away, poured molten lead, boiling oil, burning resin, wax and sulphur melted together and then his body drawn and quartered by four horses and his limbs and body consumed by fire, reduced to ashes and his ashes thrown to the winds. (Foucault, 1975, P.1).

Modern readers of Discipline and Punishment recoil from its lurid descriptions. It is disturbing to imagine fellow human beings acting so savagely. Yet the account was taken from a popular paper Gazette d'Amsterdam and, far from recoiling, a vast crowd gathered to catch a glimpse of the spectacle. As modern readers, our reactions to the newspaper's words are likely deeply different from those of readers in 1757. All of which raises a fundamental question: What mental mechanisms make it possible for people to become indifferent to, or even enjoy, the suffering of a fellow human being?

This article cannot fully solve this social-functionalist puzzle but it does begin the process of assembling promising pieces. Our inquiry centers on face perception: Do people process the faces of norm violators differently from those of others? And, if so, what is the functional significance of this differential processing? Does it make it easier to punish norm violators?

A useful starting point is to acknowledge the substantial experimental literature that has documented that people are predisposed to punish norm violators (Fehr & Fischbacher, 2004). Unlike most other species, human observers will incur personal costs to impose costs on those who harm others. This punitive predisposition is hard to reduce to cold, cognitive utilitarian-deterrence calculations (Darley & Pittman, 2003; McKee & Feather, 2008; Weiner, Graham, &

Reyna, 1997). When the perpetrator is seen as culpable (Alicke, 2000) or blameworthy (Malle, Guglielmo, & Monroe, 2014; Weiner et al., 1997), people tend to act like retributivists who punish in proportion to the harm done to the victims, (Tetlock et al., 2007) as well as the harm (real or symbolic) done to society as a whole (Atran & Ginges, 2012; Haidt & Graham, 2009).

However, it is also important to acknowledge that punishment causes harm on fellow human beings, who cannot defend themselves, to suffer. Given the high frequency of helping and other prosocial behavior observed among humans (Lowenstien & Small, 2007), it is striking that humans so frequently engage in behavior that, were it not collectively sanctioned, would be regarded as profoundly anti-social. For example, if it were not legitimized by the state, jailing would be considered kidnapping and execution, murder. This disconnect is easiest to observe in the disgust people often feel for other cultures' punitive practices (e.g. American attitudes toward Saudi Arabian justice or European attitudes towards capital punishment in the U.S.). Although, prior work suggests that there are automatic mechanisms to facilitate the detection of norm violators (Cosmides, Barrett & Tooby, 2010; Cosmides & Tooby, 1992), prior work has examined not examined the mechanisms that facilitate punishment itself.

Our working hypothesis is that visual mechanisms—in particular, the attenuation of face-typical processing—enables punitive action. Past research has found that showing the face of the target person increases willingness to help the person shown (e.g., Small & Loewenstein, 2003; Kogut & Ritov, 2005, 2007). We suggest that faces do not interfere with the punitive action aimed at norm violators because of rapid changes in the processing of the faces of those violators.

It has been well established that people are extremely skilled at recognizing faces. A preference for faces like stimuli appears to be innate. Babies react to facial distress (Johnson, Dziurawiec, Ellis, & Morton, 1991) and newborns preferentially orient toward stimuli with face-like first-order relations (Johnson, Dziurawiec, Ellis, & Morton, 1991; Mondloch, Lewis, Budreau, Maurer, Dannemiller, Stephens, & Kleiner-Gathercoal, 1999). Adults can recognize an inordinate number of individuals quickly. Even when these individuals have different hairstyle, are

presented from different viewpoints, in different lighting, or are even at different ages, that is, unless the presentation of the person is upside down or face-typical processing is otherwise disrupted (Johnson, 2005; Ellis, Bruce, & De Schonen, 1992).

Adults' skill in recognizing faces is often attributed to holistic processing—processing not just the shapes of individual features but also the relations among them (Richler, Cheung, & Gauthier, 2011). Neuro-cognitive researchers have amassed convincing evidence that holistic processing is distinct from other forms of perceptual processing; that certain regions of the brain are dedicated to holistic processing (Kanwisher, Tong, & Nakayama, 1998; Tarr, & Gauthier, 2000); and that individuals with localized damage to the fusiform area show selective impairment in holistic processing (Farah, Wilson, Drain, & Tanaka, 1995; Avidan, Tanzer, & Behrmann, 2011).

There is some evidence that changes in facial processing connect to changes in social cognition. Research suggests, for instance, that people process the faces of out-group members differently. Although other race effects were long attributed to a differential motivation to encode the details of in-group (relative to out-group) members (e.g., Hugenberg & Sacco, 2008; Rodin, 1987), a number of studies have shown that same-race faces are also processed more holistically (e.g. Michel, Rossion, Han, Chung, & Caldara, 2006).

One possible explanation for the differential processing is differential expertise. People tend to be more familiar with the types of faces that elicit holistic processing due to exposure (e.g. Kelly, Quinn, Slater, Lee, Ge & Pascalis, 2007). However, another possible explanation is the top down modulation of perceptual processing due to social-motivational contextual factors. For example, MacLin and Malpass (2001, 2003) manipulated the perceived race of racially ambiguous Hispanic-Black faces using hairstyle. Hispanic participants better remembered the same target when they believed it was Hispanic (i.e., it had a Hispanic-typical hairstyle), than when they believed it was Black (i.e., it had a black-typical hairstyle) even though the face remained the same. Other research suggests that group affiliation even may be by itself sufficient to elicit changes in processing: group affiliation can attenuate the holistic processing of

faces (Bernstein, Young, and Hugenberg, 2007) and similarly low socioeconomic status is associated with the attenuation of facial-typical processing in Caucasian (Shriver, Young, Hugenberg, Bernstein, & Lanter, 2008).

Overview

This article explores the intersection between perceptual and social psychology. Building upon prior work, we hypothesize a bidirectional relationship between social and perceptual processes. We therefore examine both the impact of experimental manipulations of social contextual cues on facial information processing and the impact of experimental manipulations of facial information processing on a class of social judgments, punitiveness judgments. Norm violators provide an important avenue for understanding interactions between social processes and perception because: (1) facial stimuli can be randomly paired to social categories; (2) harming norm violators is socially acceptable and can be measured directly.

We focus on the hypothesized social-functional consequences of changes in face processing. We demonstrate that knowledge that an individual is a norm violator leads to an attenuation in face-typical processing which in turn, influence punitive behavior. We propose that punishing transgressors is facilitated by these automatic perceptual changes, which occur outside of awareness.

The current series of 7 studies test hypotheses derived from a theory of perceptual dehumanization, which posits that individuals do not perceive the targets of retributivist wrath as fully human – the targets are "perceptually dehumanized." This perceptual shift facilities the infliction of harm. Studies 1 through 5 use a multi-method array of techniques to address the question: do people process the faces of norm violators differently from those of others? Studies 6 and 7 use different methods to test whether featural processing makes it easier to punish norm violators.

Study 1

Studies 1 and 2 assess the degree to which information about prior behavior changes how faces are processed. We predict the faces of norm violators are perceived differently from those of others. Study 1 uses the facial inversion effect to gauge the inhibition in the face-specific processing of norm violators.

Specialized face processing is particularly vulnerable to orientation effects (Farah, Tanaka, & Drain, 1995). Studies have consistently documented a face-inversion effect: a 180 degree rotation of faces impairs recognition much more than a 180 degree rotation of comparably complex non-face objects (Scapinello & Yarmey, 1970; Yarmey, 1971). An inhibition of the face-inversion effect suggests a change in the way in which people are processing faces. The theory of perceptual dehumanization predicts a reduction in the face-inversion effect for faces linked to negative but not positive actions.

Method

Participants. Participants were 48 (28 Male and 20 Female) students at a northeastern university who participated in partial fulfillment of a course requirement. Data was collected over a two-week period. Sample size was determined by the number of students who volunteered to participate in the 12 days between the study posting and the end of the term. The average age of participation was 20.4 (*SD*=.9) and s's were liberal (*M*=5.2 on a 7 point scale).

Stimuli. 72 face stimuli were taken from Ballew and Todorov (2007). Our images were restricted to white male runner-ups in gubernatorial elections. Images were cropped to 150 × 215 pixels, placed on a standard background, and converted to grayscale.

Procedure. We used a recognition memory task to measure perceptual dehumanization. For every participant, the experiment consisted of six blocks, each consisting of 12 face–action associations. In three blocks, faces appeared upright during both the study and test phases; in three blocks, the faces appeared as inverted during both the study and test phases. To control for difficulty or learning effects, the order of blocks was randomized across participants. Faces and actions were randomly assigned to one of six blocks. For each participant faces appeared in a random order. When any specific face appeared, the action associated with that face was

randomized independently. This structure of randomization allowed us to control for three potential biases: (1) order effects; (2) bias due to a specific face; (3) bias due to a face-action pairing.

As Figure 1.1 shows, each block consisted of a study phase and a test phase. In the study phase, participants learned 12 face-action pairings by simultaneously seeing a single face (either upright or inverted) and a single action on a screen for 8.5 seconds. Participants were told the individual depicted in the photograph had performed the action described below the photograph. During the test phase, actions were shown in a random order below an array consisting of all 12 faces. Participants were asked to identify the correct face from the array by indicating the number associated with face. Face arrays were created by randomly assigning each of the 12 faces a number.

Actions appeared serially below the face array, and the participant identified the face originally linked to the action in learning phase from the array. Actions systematically varied in moral valence. Negative actions, norm violations, were restricted to actions resulting in five or more years in prison as indexed by mandatory minimum sentencing laws. Language was taken from federal sentencing guidelines. Whenever possible, to control for negativity dominance, we defined positive actions as intentional actions that resulted in 2 to 3 times the positive impact as the negative actions caused harm. For example, a negative action of stealing $10,000 dollars would be paired with a positive action of donating $30,000 or murdering one individual was paired with saving the lives of two individuals. Neutral actions reflected preferences that had no impact beyond the individual action.

After completing the memory task, participants were asked their gender, age and political beliefs. All measures and conditions are reported here.

Results

All participants were included in the data analysis. We conducted a 2 (orientation: upright, inverted) X 3(valence: positive, neutral, negative) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 6 act-face combinations. Results

replicated the face inversion effect --participants were more accurate at identifying faces-action pairings when pairing used upright (*M*=.61, *SD*=.22) than inverted (*M*=.48, *SD*=.27) faces $F(1,43)=33.4$, $p<.001$, $\eta_p^2 = .41$.

The hypothesized interaction between the orientation of the face and the valence of the action also emerged, $F(2,43)=4.09$, $p<.05$, $\eta_p^2 = .15$. Participants were more accurate at identifying inverted faces paired with negative actions (*M*=.54, *SD*=.23) than inverted faces paired with positive(*M*=.45, *SD*=.20), $t(46) = 4.4$, $p < .001$, *d*'= .41 or neutral actions (*M*=.45, *SD*=.21), $t(46) = 2.9$, $p <.002$, *d'* = .40, but they were not more accurate at identifying upright faces paired with negative actions, $t(46) = .2$, $p =.42$. There was clear reduction in the inversion effect for faces linked to negative actions.

Discussion of Study 1

The reduction in the facial inversion effect suggested that participants were no longer processing the faces of norm violators as they process other human faces. Although this suggests a change in holistic processing, it is important to acknowledge that the facial inversion effect is not necessarily driven by changes in the holistic processing of faces. The specific mechanisms underlying the facial inversion effect remain a topic of empirical debate (Young, Hellawell, & Hay, 1987). In fact, recent work has argued that face inversion may simply reflect quantitative changes in processing rather than qualitative changes (Sekuler, Gaspar, Gold, & Bennett, 2004). Although it is unclear what specific mechanisms are work in Study 1; Study 1 suggests the faces of norm violators are clearly perceived "differently" from those of others. From a social psychological perspective, it is the atypicality that matters most, not the exact character of the perceptual mechanism.

Study 2

Whereas Study 1 used an independent variable that impairs face typical processing, Study 2 uses an independent variable that impairs featural processing and enhances reliance on holistic processing. Because the latter effect increases reliance on holistic information (the

process that, we argue, is being impaired by association with norm violators), this manipulation should reduce individuals' ability to identify faces paired with norm violations. Study 2 thus allows us to test the counter-hypothesis that the improved accuracy scores in Study 1 were simply driven by increased effort or by subtle measurement-scale artifacts.

Featural information about specific aspects of faces (e.g., shape of chin or nose) is finer grained than holistic information. Therefore, removing high frequency spatial information should disproportionally degrade featural processing (Goffaux, Hault, Michel, Vuong, & Rossion, 2005) relative to holistic processing, thus increasing the relative role of the latter. The perceptual dehumanization hypothesis predicts that the effects of facial blurring should be the opposite of facial inversion. Low spatial frequency, blurring the faces, should reduce the identifiability of the inverted faces of norm violators relative to the faces of norm followers.

Method

Participants. Participants were 208 (88 Male and 120 Female) students at a northeastern university who participated in exchange for payment. Data was collected over a one-week period in the Wharton Behavioral lab. Sample size was determined by the number of participants who signed up to participate during the five day interval the study was scheduled to run. The average age of participation was 20.5 (*SD* = .9) and liberal (*M*= 5.0 on a 7 point scale).

Stimuli. 40 neutral expression male faces were taken from the KDEF database (Lundqvist, Flykt, & Öhman, 1998). The faces were Fourier transformed and multiplied by high-pass Gaussian filters that preserved low (< 8 cycles/face width) spatial frequencies (see Figure 1.2). Full spectrum (FS) faces were also used.

Procedure. We used a recognition memory task to measure perceptual dehumanization. In four of the blocks, faces displayed were full spatial frequency, and in the other four blocks faces were low spatial frequency. In each block participants completed a learning phase, followed by visual distraction and then a testing phase. In the learning phase, participants learned 10 face-action pairings by simultaneously viewing a single face on screen (either normal resolution or low spatial frequency) and a single action for 12 seconds. Participants were told the

individual depicted in the photograph had performed the action described below the photograph. Face and action randomization used the same method as Study 1. During the test phase, all 10 faces from the learning phase of the block were displayed in a single array that remained on screen. Actions appeared serially below the face array, and the participant identified the face originally linked to the action in the learning phase from the array. Face arrays were created by randomly assigning each of the 10 faces a number. Actions systematically varied in moral valence as in Study1. After completing the memory task, participants were asked their gender, age and political beliefs. All measures and conditions are reported here.

Results

We conducted a 2 (spatial frequency: low only, high and low) X 2(valence: positive, neutral, negative) within-in subject analysis of variance (ANOVA) using the average response accuracy for each of the 4 act-face combinations. Not surprisingly, given the reduction in identifying information, participants were more accurate at identifying face-action pairings when faces displayed full spatial frequency (*M*=.74, *SD*=.25) than low spatial frequency faces(*M*=.66, *SD*=.27), $F(1,205)=58.2$, $p<.001$, $\eta_p^2 = .48$. The hypothesized interaction between spatial frequency and valence also emerged, $F(2, 204)=38.8$, $p<.001 \eta_p^2= .19$. Participants were less accurate at identifying low spatial frequency faces paired with negative actions (*M*= .60, *SD*=.28) than low spatial frequency faces paired with positive actions (*M*= .69, *SD*=.25), $t(207) = 2.79$, $p =.002$, *d'*=.34 or neutral actions (*M*= .68, *SD*=.27) $t(207) = 2.05$, $p =.007$, *d'*= .29.

Discussion

Removing high frequency spatial information should disproportionately degrade featural processing (Goffaux et al., 2005) relative to other types of face processing, such as holistic, thus increasing the relative role of the latter. As predicted, participants were relatively impaired when low frequency faces were linked to negative as opposed to positive actions. This pattern of result suggests that participants rely more heavily on featural information when faces are linked to negative actions. Consistent with the theory of perceptual dehumanization, participants again did

not process the facial information of norm violators the same way that they processed other human faces.

Study 3

There remain three interpretive problems with Studies 1 and 2. First, because the actions and faces were displayed contemporaneously, participants may have spent different amounts of time looking at the face versus the actions across conditions. Second, Studies 1 and 2 manipulate the valence of an action, which allows many other features of the actions to vary. Finally, Studies 1 and 2 use a recall recognition task, rather than a perceptual matching task. Study 3 addresses all these issues.

First, this study addresses confounds due to timing by having the faces and actions displayed serially, rather than simultaneously. Second, in studies 1 and 2 participants are exposed to targets that behaved in a moral, immoral or neutral fashion. It is hypothesized that immoral (i.e., norm violators) targets trigger perceptual dehumanization. To establish if this is the case, however, the valence of actions needs to be controlled to rule out the possibility of a general negativity effect on face processing. Study 3 rules out this potential confound. To keep the negativity associated with the action the same across conditions, we use the same actions and vary whether the face is associated with the victim or the perpetrator of the harm. This ensures any change in the processing of faces is due to the norm violation and not the valence of the action.

Finally, thus far it can be argued that effects are based in recall, not recognition. Study 3 uses a more traditional task by manipulating processing using the Face Composite Task (FCT) in which two faces are split horizontally and combined. It's easier to identify the top half-face when it's misaligned with the bottom one than when the two halves are fitted smoothly together (Young et al., 1987). This is because the impression of the composite image is a novel face that does not resemble the original person depicted in the top or bottom portion of the image. As a result, participants are unable to selectively attend to the cued portion of the face. However, when the

top and bottom half are misaligned, participants can recognize both the top and bottom half of the face. This is because misaligning the faces disrupts holistic processing by allowing individuals to process the top and bottom half of the face separately. To further diversify our methods of manipulating facial processing, Study 3 uses a facial composite task

Method

Participants. Participants were 53 (24 Male and 29 Female) students at a northeastern university who participated in exchange for partial fulfillment of a course requirement. Data was collected over a one-week period at the end of the semester. Sample size was determined by signup.

Stimuli. The Caucasian thirty-two male face stimuli taken from the Chicago Face Database (Ma, Correll, Witenbrink, 2015) were used to form face composites. All faces were fitted onto a 256 x 256 pixel white background and converted to greyscale. Pairing each target top part with a bottom part from another individual created composite faces. In order to ensure same and different trials were identical, randomly paired top and bottom parts from different individuals to form both the study and test stimuli. Luminance of the bottom half of each face, was adjusted to match the top half. Each of the thirty-two target top parts appeared approximately once in each condition.

Procedure. We used a modified Facial Composite Task to measure perceptual dehumanization. As Figure 1.3 shows, prior to completing every other trial of the matching task, participants learned some background information about the individuals whom the two targets they are about to see correspond to. Specifically, participants learned about a crime which occurred in which one of the individuals is the victim one of the individuals is the perpetrator. An example action is: “Dylan shot Jeff during a robbery.” The action appeared on screen for 8500 milliseconds. After reading the crime, participants performed a perceptual recognition task involving each of the actors as identified by using the name (e.g. “Dylan” or “Jeff”). The matching task was separate for each of the targets. The order of the perpetrator and victim was

counterbalanced. Participants learned about 64 actions and therefore completed 128 trials of the FCT.

A trial consisted of the sequential presentation of face pairs. It began with the display of an action on screen for 8000-ms. Following a 400ms interstimulus interval, the target face and actor name(randomly determined to be the victim or the perpetrator) appeared and remained on screen for 600-ms. After a 1000-ms interstimulus interval, the sample face appeared for 800 ms. Following a 400ms interstimulus interval, the second target face and name (if the first name belonged to victim, the perpetrator's was used or vis-versa) appeared and remained on screen for 600-ms. After a 1000-ms interstimulus interval, the sample face appeared for 800 ms.

Subjects were instructed to attend only to top part of the face and had 750 ms to decide, as fast and accurately as possible, whether these were the same or different. The target and sample faces appeared at slightly different screen locations, to avoid subjects comparing a specific location of the display to perform the matching task. The participants expressed their choice by pressing a left versus right key on a keyboard placed in front of them. Same-aligned and same-misaligned faces appeared twice as target faces: once in a "same" trial, once in a "different" trial. Target and sample faces always differed with regard to their bottom part. In half of the trials, the top parts were identical (demanding a "same" response). In the other half, both top and bottom parts differed (demanding a "different" response). The experiment comprised 64 experimental trials randomly mixed up across subjects.

Results

Results of study 3 were largely consistent with those of studies 1 and 2. We conducted a 2 (alignment: intact, offset) X 2(actor: victim, perpetrator) repeated measure analysis of variance (ANOVA) using the sensitivity index for each of the 4 act-face combinations.

Participants showed greater sensitivity at identifying faces of the victim than faces of the perpetrator (*M*=.26, *SD*=1.3) than the faces of the victim (*M*=.61, *SD*=1.1), $F(1,53)=32.5$, $p<.001$, $\eta_p^2 = .389$. Participants had non-significantly greater sensitivity at recognizing offset (*M*=.51,

SD=1.2) than intact faces (*M*=.37, *SD*=1.2), *F*(1,53)=3.76, *p*=.058, η_p^2= .07. Importantly, there was a significant interaction between action type and alignment, *F*(2, 53)=6.80, *p*=.01, η_p^2= .12. When the actor was a perpetrator participants showed no more sensitivity to intact (*M*=.30, *SD*=1.3)faces than offset(*M*=.22, *SD*=1.3) faces, *t*(52) = 2.53, *p* =.99, *d*'= .07. However, when the actor was a victim participants showed greater sensitivity to offset faces (*M*=.80, *SD*=1.1)than intact faces(*M*=.43, *SD*=1.2) , *t*(52) = 2.78, *p* =.004, *d*'= .35.

Discussion of Study 3

Study 3 resolves three important interpretive problems with the previous studies. By presenting the information about the actor prior to displaying the face the study controls for different amounts of time looking at the face versus the actions. Second, the study controls for the effect of valence. Because the action is the same across conditions the negativity associated with the action cannot drive the difference between conditions. Thirdly, the study uses a perceptual matching task; therefore differences across conditions cannot be driven in recall.

Finally, the facial composite task directly manipulates holistic processing. Therefore, unlike Studies 1 and 2 where the mechanisms underlying changes are somewhat controversial, changes in processing in Study 3 can be more directly attributed to changes in holistic processing. However, it should be noted that this study used a partial design (Gauthier & Bukach, 2007; Richler, Cheung, & Gauthier, 2011). Concerns have been raised with this version of the task, because of a potential problem with response bias.

Study 4

In this paper, we argue that attenuation of the holistic processing of faces occurs in order to facilitate punishment. Therefore the attenuation of holistic processing should only occur for actors whom people desire to punish.

Prior work on punitiveness suggests that punitive drives are only elicited when the perpetrator is seen as culpable (Alicke, 2000) or blameworthy (e.g. Malle, Guglielmo, & Monroe,

2014). We apply the culpable control model to refine our theoretical claims. The culpable control model specifies the conditions under which individuals ascribe blame, such as whether situational pressures (e.g., coercion, provocation) or personal incapacities (e.g., ignorance, mental illness) are sufficient to excuse conduct blame (Alicke, 2002; Alicke, Rose, & Bloom, 2011). The model postulates that one pathway via which culpability can be reduced is the link between behavior and its consequences—or causal control.

Study 4 directly manipulates causal by varying only the intention of the action. The theory of perceptual dehumanization therefore predicts a reduction in the face-inversion effect only when faces are linked to intentionally, not unintentionally, harmful actions.

Method

Participants. Participants were 204 (98 Male and 106 Female) students at a northeastern university who participated in exchange for payment. Data was collected over a one-week period in the Wharton Behavioral lab. Sample size was determined by signup. The average age of participation was 20.5 (stdev .9).

Stimuli. The twenty male face stimuli taken from the Chicago Face Database (Ma, Correll, Witenbrink. 2015) were used to form face composites. All faces were fitted onto a 256 x 256 pixel white background and converted to greyscale. Pairing each target top part with a bottom part from another individual created composite faces. In order to ensure same and different trials were identical, randomly paired top and bottom parts from different individuals to form both the study and test stimuli. Luminance of the bottom half of each face, was adjusted to match the top half. Each of the 16 target top parts appeared approximately once in each condition.

Procedure. Subjects performed a perceptual matching task in which they indicated if the top half of two faces matched. Prior to each trial of the perceptual matching task, participants learned about an intentional or unintentional harm the target perpetrated.

All that varied was the use of the word intentional versus accidental in descriptions of the act. Which actions were associated with intentional and unintentional harms was

counterbalanced across participants. For example, when an action appeared as an intentional harm "Dylan intentionally shot his brother while hunting" while when the action appeared as an unintentional harm it would read, "Dylan unintentionally shot his brother while hunting."

After reading the action, participants performed a perceptual recognition task. To ensure participants associated the face with the action, the name of the actor appeared below the face (e.g. "Dylan"). It began with the display of an action on screen for 800-ms. Following a 500ms interstimulus interval, a face appeared on screen for 400-ms. After a 1000-ms interstimulus interval, the sample face appeared for 800 ms. To avoid subjects comparing a specific location of the display to perform the matching task, the target and sample faces appeared at slightly different screen locations. In half of the trials both the top and bottom half of the target and sample face were aligned. In half of the trials both the top and bottom half of the target and sample face were misaligned.

Participants had 750 ms to decide, as fast and accurately as possible, whether these were the same or different. The participants expressed their choice by pressing a left versus right key on a keyboard placed in front of them. Same-aligned and same-misaligned faces appeared twice as target faces: once in a "same" trial, once in a "different" trial. Target and sample faces always differed with regard to their bottom part. In half of the trials, the top parts were identical ("same"). In the other half, both top and bottom parts differed ("different"). Intentional and unintentional actions, as well as aligned and misaligned trials were randomly interleaved. The experiment comprised 64 experimental trials randomly mixed up across subjects.

Results

Results of study 4 were largely consistent with the results of study 3. We conducted a 2 (alignment: intact, offset) X 2(action: intentional, accidental) repeated measure analysis of variance (ANOVA) using the sensitivity index for each of the 4 act-face combinations. Results suggests participants were had greater sensitivity at recognizing intact (*M*=.91, *SD*=1.3) than offset (*M*=.46, *SD*=1.1) faces $F(1,200)=135.2$, $p<.001$, $\eta_p^2= 1.14$. Participants displayed non-significantly greater sensitivity at identifying faces paired with unintentional than intentional harms

F(1,200)=2.076, *p*=.15. However, there was a significant interaction between action type and alignment, *F*(2, 199)=28.2, *p*<.001, η_p^2 = .28. When the action was intentional, participants did not show different sensitivity to intact (*M*=.44, *SD*=1.3) faces than offset (*M*=.66, *SD*=1.3) faces, *t*(52) = .48, *p* =.83, *d'*= .17. When the action was unintentional participants showed greater sensitivity to offset faces (*M*=1.42, *SD*=1.3) than intact faces (*M*=.34, *SD*=1.1) , *t*(52) = 5.43, *p* <.001, *d'*= .86.

Discussion of Study 4

Study 4 links perceptual dehumanization to culpability. Key to the functionalist argument, the attenuation of holistic processing only occurs for actions that people desire to punish.

Study 5

Study 5 further tests the social-functionalist claims made in Study 4. Study 4 manipulated culpable control by manipulating whether the action was performed accidentally or purposefully. However, the culpable control model postulates another pathway via which attributions of responsibility can be reduced: culpability. The phrase "culpable control" refers to the fact that the desire to blame or find someone culpable requires assessments of mental states and agentic control over outcomes (“mens rea” in the law).

Culpable control suggests that attributions of responsibility are not only dependent on the action, but on the actor’s mental state. As a result, the same action can be interpreted differently depending on beliefs about the actor. In Study 5 we manipulate culpability by altering volitional behavioral control. Specifically, we manipulate participants’ beliefs about the perpetrator’s psychological capacity constraints.

Method

Participants. Participants were 126 (47 Male and 79 Female) students at a northeastern university who participated in exchange for course credit. Data was collected over a two-week period. The average age of participation was 19.7 (stdev 1.3) and liberal (mean 4.7 on a 7 point scale).

Stimuli. 32 face stimuli were take from taken from the KDEF database (Lundqvist, Flykt, & Öhman, 1998). Images were cropped to 250 × 350 pixels and converted to grayscale.

Procedure. Prior to completing the recognition memory task, participants read an article documenting the genetic and environmental contributions to pedophilia relative to impulsive violent behavior. In one condition, pedophilic behavior was described as highly predetermined and impulsive violent behavior was described as highly controllable. In the other condition impulsive violent behavior was described as highly predetermined and pedophilic behavior was described as highly controllable. Following the passage, participants completed a reading comprehension check, which if they failed, were reshown the relevant information from the passage until they passed.

After completing the reading comprehension, participants completed a recognition memory task to measure perceptual dehumanization. In three blocks, faces were displayed intact, and in three blocks faces were offset. In each block, participants completed a learning phase and then a testing phase. In the learning phase, participants learned 8 face-name/action-type pairings by simultaneously seeing a single face (either intact or offset) and a single action on a screen for 8.5 seconds. During the test phase, all 8 faces from the learning phase of the block were displayed in a single arrangement that remained on screen. Names appeared serially below the face array, and the participant identified the face originally linked to the action in learning phase from the array.

Display order in both the test and recall phase and face-action pairings were fully randomized. Half of the individuals were described “pedophilic” while the other half described “violent”. Action type and names were randomly paired with faces

Results

We conducted a 2 (Offset: Intact, Offset) X 2(action: pedophiliac, violent) X 2(condition: pedophilia controllable, violence controllable) mixed-model analysis of variance (ANOVA) using the average response accuracy for each of the 4 act-face combinations. Results indicate an effect of facial offsetting; participants were more accurate at identifying offset than intact (*M*= .64,

SD=.22) than offset (*M*= .52, *SD*=.25) faces $F(1,124)=129.0$, $p<.001$, $\eta_p^2=.39$. There was also a main effect of action type; participants were more accurate at identifying face-action pairings when the action was associated with pedophilia (*M*= .64, *SD*=.21) than with violent behavior(*M*= .53, *SD*=.26) , $F(1,124)=33.598$, $p<.001$, $\eta_p^2=.22$.

There was an unpredicted interaction between action type and condition, $F(1,124)=33.598$, $p<.001$, $\eta_p^2=.22$. This interaction was due to participants being more accurate at identifying pedophiles when they believed the pedophiles were responsible for their actions (*M*= .68, *SD*=.21) than when they were told pedophiles they were not responsible for their actions, (*M*= .60 *SD*=.21) $t(128) = 1.94$, $p = .028$, *d'*= .25.

The hypothesized higher-order interaction also emerged among culpability prime, alignment and action $F(3, 205)=7.3$, $p=.007$, $\eta_p^2 = .055$. Reductions in facial offsetting were attenuated by perceived psychological capacity constraints. When participants believed pedophilia was due to a psychological capacity constraint, there was a significant effect of offsetting on facial recognition $t(52) = 3.76$, $p < .001$, *d'*= .59. However, when the pedophilia was viewed as controllable, there was no effect of offsetting on facial recognition $t(52) = .525$, $p = .30$, *d*'= .14. Conversely, when participants believed violent behavior was due to a psychological capacity constraint, there was a significant effect of offsetting on facial recognition $t(52) = 2.8$, $p = .002$, *d*'= .29. However, when the violent behavior was viewed as controllable there was no effect of offsetting on facial recognition $t(52) = 5.01$, $p < .001$, *d*'= .67.

Discussion

Study 5 further links perceptual dehumanization to culpability. Because the actions are held constant across conditions, the effects cannot be due to either valence or differences in the action or interpretation of the actions. While in Study 4 the meaning of the actions may vary across conditions, in Study 5 only culpability varies across conditions. The results suggest that perceived culpable control moderates perceptual effects.

Study 6

Results from Studies 1 to 5 suggest that norm violation leads to changes in visual processing of faces. Studies 6A and 6B directly link perceptual dehumanization to an increased willingness to punish. These studies test the impact of the manipulations of perceptual dehumanization used in studies 1 and 2 on punitive decisions.

Study 6A

Method.

Participants. Participants were 225 (125 Male and 100 Female) American workers on Mechanical Turk who participated for $1.00 payment. Based upon funding constraints the sample size was predetermined to be 225.

Stimuli. 60 face stimuli were take from Ballew and Todorov (2007). Our images were restricted to while male runner-ups. Images were cropped to 150 × 215 pixels, placed on a standard background, and converted to grayscale.

Procedure. Participants rated the appropriate punishment for 15 upright and 15 inverted face-action pairings on a unique 13-point scale adopted from the justice-research literature (Carlsmith, Darley, & Robinson, 2002; John M Darley, Carlsmith, & Robinson, 2001). It ranged from "No sentence" to "Death sentence" with non-linear intervals given in weeks, months, and years of incarceration. The norm violations were taken from studies 1 and 2. Actions were randomly assigned to faces for each participant. Additionally, orientation of faces was randomly determined for each participant.

Results. We conducted a 2 (orientation: upright, inverted) X (Block Order: Upright first, Inverted First) mixed model ANOVA on punitiveness. There was a significant effect of inversion on punitiveness, with inverted faces receiving significantly harsher punishments than upright faces, $F(1,222)=64.8$, $p<.001$, $\eta_p^2 = .06$. This suggests inhibition of holistic processing may function to increase the punitive drive.

Study 6B

Study 6A suggests that impairing holistic processing increases punitiveness. However, the effects in Study 6A may be due to victim identifiability. Therefore, Study 6B tested whether

increasing holistic processing (by removing high frequency spatial information) reduces punitiveness. Because this study predicts the opposite pattern of results, it rules out the possibility that the processing manipulations are simply reducing the identifiability of victims and therefore increasing punitiveness.

Method.

Participants. Participants were 225 (117 Male and 108 Female) American Masters workers on Mechanical Turk who participated for $1.00 payment. Based upon funding constraints the sample size was predetermined to be 225.

Stimuli. 30 neutral expression male faces were taken from the KDEF database (Lundqvist, Flykt, , & Öhman, 1998). The faces were Fourier transformed and multiplied by high-pass Gaussian filters that preserved low (< 8 cycles/face width) spatial frequencies (see Figure 1.2). Full spectrum (FS) faces were also used.

Procedure. Participants rated the appropriate punishment for 15 upright and 15 blurry face-action pairing on a 13-point scale adopted from the justice-research literature(Carlsmith et al., 2002; John M Darley et al., 2001). 30 norm violations were randomly selected from studies 1and 2. Which actions were paired with upright or inverted faces were counter-balanced across participants to control for differences across actions.

Results. A 2 (Spatial frequency: Low only, High and low) X (Block Order: Upright first, Inverted First) repeated measure ANOVA revealed a significant effect of blurring on punitiveness, with low frequency faces receiving significantly more lenient punishments than normal faces, $F(1,222)=53.2$, $p<.001$, $\eta_p^2= .12$. Consistent with the results of Study 6A, this again suggests inhibition of holistic processing may function to increase the punitive drive.

Discussion

Studies 6A and 6B directly link perceptual dehumanization to an increased willingness to punish. As illustrated by Figure 1.4, inverted faces and low spatial frequency faces have opposite effects on punitiveness. Study 6A impairs typical face processing and demonstrates that impairments in face processing increase punitiveness. Study 6B impairs holistic processing and

demonstrates that impairments in holistic processing decrease punitiveness. Importantly, although both studies 6A and 6B both distort faces, in line with our predictions they push punitiveness in opposite directions.

Study 7

Study 6 tested the impact of impairing processing via overt manipulations of facial process. Study 7 builds on these prior studies by impairing facial processing in a manner routinely used in real punishment: blindfolding the recipient of collectively mandated corporal or capital punishment. Additionally, rather than measuring punitive drive we measure desire to stop punishment – a more realistic measure of how ordinary individuals respond emotionally to punitive behavior.

Study 7A

Method.

Participants. Participants were 78 (98 Male and 51 Female) American workers on Mechanical Turk. Participants were paid $1.00 in exchange for completion of the survey. The average time of completion was about 10 minutes. Data was collected over a five-hour period. Sample size was predetermined to be 150. The average age of participation was 31.9 (SD 8.8) and liberal (mean 4.5 on a 7 point scale, SD 1.5).

Stimuli. 4 high-resolution pictures of 2 punitive practices with exposed faces were collected from various Internet sources (e.g., CNN, Wikipedia, and local media sources). The image of each politician was cropped to 550 × 350 pixels and placed on a standard background. A graphic artist was hired to make images appear as though each individual was wearing a blindfold or a gag.

Procedure. We measured opposition to cruel and inhumane punitive practices by a self-report, using a between-subject design. Participants read a brief description of four different punitive practices— flogging, electrocution, beheading, and hanging. Following the description of each practice, participants viewed a photograph of the practice. Participants were randomly

assigned to one of three conditions. In one condition, the faces of the individuals' depicted in the photograph were randomly assigned to have their eyes covered by a blindfold. In the second condition, the faces of the individuals' depicted in the photograph were randomly assigned to have their mouth covered by a gag. In the final condition, the individuals' face was fully exposed.

The photograph remained on screen for at least ten seconds. Punitive practices appeared in a randomly determined order. After viewing each photograph, participants rated the degree to which they found the punishment morally reprehensible. We measured this belief by asking participants the degree to which they agreed with the statement, "This form of punishment is morally reprehensible", on a visual analog scale ranging from 0 (Strongly Disagree) to 10 scale (Strongly Agree).

Results. We conducted a 3 (Covering: blindfold, gag, none) X 3(punishment type: flogging, beheading, hanging) mixed-model analysis of variance (ANOVA), using the self-reported moral condemnation.

In line with our predictions, obscuring the face of the punished individual significantly reduced condemnation of the punishment $F(2, 146)=3.77$, $p=.025$, $\eta_p^2=.049$. Participants condemned punishment significantly less when the individual was blindfolded ($M=5.5$, $SD=2.6$), than when he was gagged ($M=7.1$, $SD=2.9$), $t(98) = 2.06$, $p = .022$, $d' = .51$ or when his entire face was exposed($M=7.2$, $SD=2.8$), $t(207) = 2.03$, $p = .024$, $d' = .48$. There was no significant difference in reaction to the gagged individual and the individual with the fully exposed face, $t(207) = 1.42$, $p = .92$, $d' = .03$.

There was a significant effect punishment type on donations, $F(2, 146) = 5.86$, $p=.003$, $\eta_p^2=.039$. Participants expressed the greatest condemnation for beheading ($M = 7.0$, $SD = 3.2$) and the least condemnation for [[??]] ($M = 6.3$, $SD = 3.4$). There was also a significant interaction between punishment and covering $F(4, 146)=2.85$, $p=.024$, $\eta_p^2 = .012$. This appears to be driven by the impact of gagging on flogging. [[]] Gagging condition significantly reduced condemnation of flogging. This effect was also unpredicted.

Study 7B

Method.

Participants. Participants were 213 (88 Male and 120 Female) students at a northeastern university who participated in exchange for payment. Data was collected over a one-week period in the Wharton Behavioral lab. Sample size was determined by signup. The average age of participation was 19.9 (SD= .8) and liberal (M= 5.0 on a 7 point scale).

Stimuli. 10 high-resolution pictures of 8 punitive practices with exposed faces were collected from various Internet sources (e.g., CNN, Wikipedia, and local media sources). The image of each politician was cropped to 550 × 350 pixels and placed on a standard background. A graphic artist was hired to make images appear as though each individual was wearing a blindfold.

Procedure. We measured opposition to cruel and inhumane punitive practices using a donation task in a within-subject design. Participants read a brief description of five different punitive practices—flogging, caning, electrocution, beheading, and hanging—all of which were selected because they are not only brutal but also still practiced in various parts of the world. Following the description of each practice, participants viewed a photograph of the practice. In the photograph, the individual depicted was randomly assigned to have his eyes covered by a blindfold or eyes exposed. The photograph remained on screen for at least ten seconds. Practices appeared in a random order.

Following exposure to all five practices, participants completed a donation task. Participants were given 50 tokens (equivalent to $5.00). Participants could allocate the tokens in any proportion they chose among six different options. Each form of punishment was associated with a unique fund to which they could donate tokens for the purpose of stopping that specific form punishment. The sixth option allowed them to keep as many tokens as they wanted for themselves. The order of options was randomized across participants.

Results. We treated each rating as an observation and conducted a mixed-model ANOVA that treated type of punishment as a random effect. As illustrated in Figure 1.5, a 2 (Eyes: exposed, not exposed) X 5(punishment type: flogging, canning, electrocution, beheading,

hanging) ANOVA revealed a significant effect punishment type on donations, $F(4, 105) = 53.42$, $p < .0001$. The most money was donated to stop beheading (M = \$1.30, SD =\$1.00) and the least was donated to stop electrocution (M =\$0.53, SD =\$0.48). Importantly there was a significant effect of eye treatment: when the eyes were exposed significantly more money was donated to stop the punishment (M = \$0.90, SD =\$0.50) than when the eyes were not exposed (M= \$0.70, SD = \$0.51), $F(1, 107) = 14.17$, $p < .0001$, d'=.4.

This effect was not driven by a reallocation of donations across punishments, but by keeping less money for oneself. Exposed eyes lead to greater donations across the board. The images with exposed eyes one saw, the less money one kept for oneself, $t(109) = -3.41$, $p < .001$.

Study 7C

Method.

Participants. Participants were 78 (42 Male and 46 Female) American workers on Mechanical Turk. Participants were paid \$1.00 in exchange for completion of the survey. The average time of completion was about 2 minutes. Data was collected over a two-hour period. Sample size was determined by signup. The average age of participation was 35.5 (SD 12.3) and liberal (mean 4.7 on a 7 point scale, SD 1.4).

Stimuli. 8 high-resolution pictures of 4 punitive practices with exposed faces were collected from various Internet sources (e.g., CNN, Wikipedia, and local media sources). The image of each politician was cropped to 550 × 350 pixels and placed on a standard background. Faces were manipulated to appear in low spatial frequency (as in studies 2 and 6)

Procedure. We measured opposition to cruel and inhumane punitive practices by a self-report, using a between-subject design. Participants read a brief description of two different punitive practices: flogging and caning. Following the description of each practice, participants viewed a photograph of the practice. For half of the participants the faces of the punished individuals were altered using a high spatial frequency filter, such that the face was displayed in Low spatial frequency. The other half of participants viewed unaltered photographs. The

photograph remained on screen for at least ten seconds. Practices appeared in a random order. After viewing each photograph, participants rated the degree to which they found the punishment morally reprehensible. We measured this belief by asking participants the degree to which they agreed with the statement, "This form of punishment is morally reprehensible" on a visual analog scale ranging from 0 (Strongly Disagree) to 10 scale (Strongly Agree).

Results. We conducted a 2 (Spatial Frequency: Broad Spatial Frequency, Low Spatial Frequency) X 2(Punishment: caning, flogging) mixed-model analysis of variance (ANOVA), using the self-reported moral condemnation as the dependent variable. Given the similarity between flogging and caning, as one would expect there was no significance different between flogging (*M*=7.2, *SD*= 3.2) and caning (*M*=7.3, *SD*= 3.2), *F*(1, 76)=.217, *p*=.642.

In line with our predictions, participants condemned punishment significantly more when the faces were displayed in LSF (*M*=7.4, *SD*=2.8) than in BSF (*M*=6.1, *SD*=3.5), *F*(1, 86)=7.36, *p*=.01, η_p^2=.088. There was no significant interaction between punishment and spatial frequency *F*(2, 76)=.044, *p*=.834.

Discussion

Study 7A demonstrates that while both the mouth and the eyes are central to identifying emotions and are equally identifiable facial features, blindfolding leads to significantly less condemnation of punishment. Study 7B uses real economic incentives to demonstrate blindfolds have an effect on real world behavior. Study 7c demonstrates this is not simply due to distortion of the faces because the opposite effect occurs when the faces are displayed in LSF.

Blindfolding or even complete covering the faces of those about to be executed is practiced across a wide range of cultures whereas gagging is not widely practiced. If one is willing to make the functionalist assumption that these practices serve to reduce the stressfulness of the experience of the executioners and to reduce public empathy for perpetrators, these observations provide informal real-world validation of the perceptual dehumanization framework—and converge with the results of Study 6A and 6B.

General Discussion

Seven studies yielded substantial support for the key predictions of the theory of Percpeutal Dehumanization. The results of seven studies suggest that humans visually process the faces of norm violators atypically and that these automatic changes in perception act to facilitate punitive behavior. Studies 1-5 use a multi-method array of techniques to produce convergent evidence that the visual mechanisms that enable the processing of faces are inhibited upon learning someone is a norm violator.

A clear advantage of the perception literature is its emphasis on mechanism, which makes it easier than in much of social psychology to pinpoint the exact strengths as well as confounds in any particular paradigm. In Table 1.1, we outline the offsetting strengths and weaknesses of each paradigm we used. Although each individual paradigm is potentially problematic, alternative artifactual explanations can be rendered implausible across these methodologically diverse studies. Weighing the entirety of the evidence, our results demonstrate impairment in the face typical processing of norm violators—an attenuation in holistic processing.

Readers familiar with the history of experimental psychology will recognize a resemblance between our findings and controversies dating back to the 1950s on the conditions under which social processes can influence perceptual processes (Bruner & Goodman, 1947). The controversies centered on two issues: (1) replicability and (2) the possibility that effects are due to response threshold shifts (or response biases), rather than perceptual shifts. We have shown replicability across different manipulations of perceptual processing (see table 1.1), and across different types of facial and contextual parameters by manipulating display timing and display size. And we have taken a key step to eliminate response bias by designing a task in such a way that response bias cannot influence key variables. Response bias would be problematic if the independent variables (facial orientation and action valence) had been the response variable (and participants had been selecting an action to match a particular face). In studies 1, 2 and 5, faces were randomized across actions and perceptual manipulation, and

responses were uncorrelated with the main and interactive effects of the independent variables. A response bias would take the form of a bias toward particular types of faces. In these studies, faces were randomized across all other dimensions, rendering systematic response bias a very unlikely counter-explanation.

Studies 3 through 5 underscore that that these attenuations of facial processing are specific to norm violators. Study 3 controls for valence as a potential confound by using same actions across conditions and only varying the role faces are assigned (victim or perpetrator). Study 4 and 5 more stringently test the functionalist logic of Perceptual Dehumanization by applying Alicke's model (2000) of culpable control and manipulating the degree to which observer see perpetrators as blameworthy. Study 4 reduces causal control by changing intent. Study 5 reduces behavioral control by altering mental capacity. The results of these studies are consistent with the functionalist hypothesis that perceptual dehumanization effects are driven by the desire to punish.

The results of Studies 6 and 7 establish a functionalist link between face processing and punishment. In Study 6, directly manipulating face processing suggests that face-typical processing reduces the ability to punish. Study 7 examines these effects in the context of visual depictions of punishment. Consistently, face-typical processing appears to impair punitive drives. The most parsimonious explanation is that changes in face processing serves the social function of facilitating the punishment of norm violators. We posit this mechanism enables individuals to satisfy conflicting demands imposed by the complexities of social interdependency: the need to get along and cooperate and the need to deter norm violations.

Human societies—unlike those of most other species—are based on large-scale cooperation among genetically unrelated individuals. As in other species, the social world of our ancestors contained individuals who were poised to exploit others if such acts were self-beneficial (Daly & Wilson, 1988; Duntley, 2005; Duntley & Buss, 2004). A sustainable social order requires beings that can switch readily between cooperation and punitiveness. Indeed, laboratory experiments and formal models alike suggest that the cooperative equilibria critical to human

social groupings would be impossible without tit-for-tat rules and third-party punishment of norm violators (Axelrod & Hamilton, 1981; Fehr & Gachter, 2000; Nowak, 2006).

A larger issue lurking in the background of this article is just how punitive are people. There are alternative views in the social psychological literature (e.g. Tetlock, 2002). Here we have worked from the assumption that people (at least in affluent Western societies) are mostly reluctant intuitive prosecutors whose default reaction is to feel each other's pain and who must switch that off to do their social duty and punish norm violators. This assumption is consistent with a good deal of work in developmental and social psychology (Tetlock et al., 2007; Hamlin, Wynn & Bloom, 2007).

Alternatively, one could make the opposite argument that empathy is required to overcome the natural tendency toward punitiveness. For example, one could posit that on a cost-benefit analysis, it would make greater survival sense for organisms to assume harmful actions or intentions and then to correct when this turns out to be untrue, than to begin with empathy and then have to overcome it. This possibility is consistent with our data; it would suggest that individual's default is to not engage in face specific processing and it is only when empathic processes are engaged that individuals do so. Past research on face processing suggests the possibility that "face-specific" processing in not the default processing of human faces (Van Bavel, Packer & Cunningham, 2011).

It is also important to pre-empt confusion that may arise from our using the term "perceptual dehumanization" which may encourage conflation with the larger literature in social-political psychology on dehumanization. Several prominent theorists have identified the social construct of dehumanization as a possible mechanism that facilitates harming others. Opotow (1990) posited that dehumanization allows people to be placed outside the boundary beyond which moral rules apply. Bandura proposed that dehumanization is one way in which moral self-sanctions are selectively disengaged. Similarly, according to Kelman (1973), when people are divested of these agentic and communal aspects of humanity they lose the capacity to evoke compassion and moral emotions.

The present research suggests perceptual dehumanization, like the social-psychological construct, acts to facilitate harm. However, unlike the social-psychological construct, perceptual dehumanization does not require endorsing negative stereotypes of the target group and likely functions with less awareness and on a more rapid time scale. Indeed, we propose that one mechanism for inhibiting cooperative impulses and facilitating punishment is rapid-fire shifts in the perceptual categorization of norm violators, in which the faces of norm violators cease to be processed in face-typical ways.

Although we argue that perceptual dehumanization acts to facilitate punishment, perceptual dehumanization may function more broadly than just applying to norm violators. For example, prior research has demonstrated that there is an attenuation in face-specific processing of individuals of other races (e.g. Michel et al., 2006) and out-group members (e.g. MacLin & Malpass, 2003). Table 1.2 lays out these potential parallels between the perceptual literature on perceptual attenuation of holistic processing and the social psychological literature on dehumanization and discrimination.

Notably, Bernard, Gervais, Allen, Campomizzi, and Klein (2012) report an inversion effect only when participants viewed sexualized male body images, but not when they viewed sexualized female body images, and they link these perceptual changes to sexual objectification. In the case of work on gender, Tarr (2013) provides an interesting counter explanation that effects are stimulus driven because female poses was more asymmetric than male. To the degree this explanation is correct, it raises the provocative possibility that cultural norms evolved in a manner that attenuate the holistic processing of less valued of subordinate groups. There is a potential parallel here between this argument and the one we advance with respect to blindfolds.

Because the attenuation of face-typical processing applies broadly, including even to minimal (experimentally created) groups, this may suggest an asymmetry between perceptual dehumanization and more explicit forms of dehumanization. We suspect that the relationship is asymmetric: it is possible to perceptually dehumanize without engaging in the explicit hatred or

derogation of social-psychological dehumanization but it is probably impossible to engage in nasty overt dehumanization without the subtle assistance of perceptual dehumanization. In short, our larger and more speculative claim is that perceptual dehumanization is a necessary but far from sufficient condition for dehumanization as that term is used in the social psychological literature.

Finally, we should note an important boundary condition on when perceptual dehumanization will facilitate norm enforcement. Observers' moral reactions to the phenomenon will hinge on their beliefs about the legitimacy of the social systems enforcing the norms. For instance, most Americans would probably deem perceptual dehumanization beneficial if it enabled killing domestic terrorists, but repugnant if it enabled Islamic fundamentalists to stone women who have been convicted of adultery. Regardless, our results suggest that the same perceptual dehumanizing process underlies these two examples.

In sum, our results reveal previously experimentally unexplored connections across levels of analyses, between the more macro social phenomena of punishment to the more micro mechanisms of face perception. Our data also potentially bridge neuro-cognitive work on facial and object perception with social psychological work on norm enforcement and punitiveness. Perceptual dehumanization suggests that crucial adaptations to group life, such as our capacity to enforce norms essential for reaching and maintaining cooperative equilibria, are internalized at a surprisingly basic perceptual-cognitive level of human mental functioning.

CHAPTER 2

Perceptual Dehumanization of Faces of Society's Defenders: The Social Function of Attenuations in the Holistic Processing of Faces

Visual representations of dehumanization abound, be it the treatment of women in advertising, the caricatures of enemies during wars or the derogation of groups preceding genocides (Hirgo, 2007; Sells, 1996; Steuter & Wills, 2009). Nonetheless, prior work has not linked these social-political forms of dehumanization to visual processing. The current article makes this linkage: it connects traditional social-psychological theorizing on the functions of dehumanization with an emerging work on the distinctive perceptual processes implicated in the encoding and processing of information about human faces.

Recent research suggests that these perceptual processes that are typically engaged when one human being looks at the face of another human being are highly sensitive to the surrounding social context (Kelly, Quinn, Slater, Lee, Ge & Pascalis, 2007; Michel, Rossion, Han, Chung, & Caldara, 2006; MacLin & Malpass, 2001, 2003). We define perceptual dehumanization as the short-circuiting of face-typical information processing. Consistent with the connotative implication of this terminology, thus far, research has documented a tight linkage between the groups that people perceptually dehumanize and groups that suffer the social costs of dehumanization. Further work has experimentally demonstrated that these perceptual changes facilitate the infliction of harm on deviants and out-groups (Fincher & Tetlock, 2015). However, the research to date is insufficient to determine whether perceptual dehumanization is simply a basic psychological process identical in its range of application to social-psychological dehumanization or a process that occurs in a wider range of social situations than those normally associated with dehumanization as that term has been used for decades in the research literature.

In the current work, we show that "perceptual dehumanization" is not functionally interchangeable with classical forms of dehumanization. Our results suggest that "perceptual

dehumanization" is functionally distinct from other forms of dehumanization. Specifically, unlike other forms of dehumanization (for a review see Haslam, 2006), the perceptual denial of humanness occurs in a broader range of circumstances—and extends even to individuals who are honored within the in-group but who are also asked to make ultimate sacrifices on behalf of the in-group, as is asked of law enforcement or military officers. This suggests that dehumanization, at least at a perceptual level, is not linked to stigmatization or negative attitudes. And from a functionalist perspective, this suggests that Perceptual Dehumanization may have emerged not only to facilitate the infliction of harm but also, more generally, to inhibit the impulse to help and thereby facilitate strategic forms of callousness.

Classic work on dehumanization focuses on explicit and brutal stereotyping and mistreatment, such as depicting target groups as rats or cockroaches that must be exterminated or indeed taking action against those groups to exterminate them (Ervin, 1989; Kelman, 1973; Lifton, 2000). More recently, researchers have explored infrahumanization, which is a subtler but still demeaning form of dehumanization (Castano & Giner-Sorolla, 2006; Cuddy, Rock, & Norton, 2007; Epley, Waytz, & Cacioppo, 2007; Leidner, Castano, Zaiser, & Giner-Sorolla, 2010). Infrahumanization operationalizes dehumanization as the denial of the affective features of humanity – specifically the denial of secondary human emotions, such as regret and nostalgia that are linked to self-awareness (e.g., nostalgia, humiliation; Leyens et al., 2003).

These seemingly disparate operationalizations of dehumanization are linked through their social function: that dehumanization makes it easier for people to harm those they see as threats to the social order. Kelman (1973) and Bar-Tal (2000) invoke dehumanization to explain the Nazi's capacity to slaughter Jews whom they saw as betrayers of Germany in World War I. Opotow's (1990) work on "moral exclusion," treats dehumanization as a process of categorizing people so they no longer fall inside the boundary where moral rules apply. Similarly, Bandura (1999) also treats dehumanization as a way of selectively disengaging moral self-sanctions. Work on infrahumanization builds upon this view. Building on work on the omission bias and casuistry, infrahumanzation researchers have shown that failures to attribute secondary emotions

are associated with the passive infliction of harm such as failures to aid the infrahumanized African American victims of Katrina.

Dehumanization is typically operationalized as a denial of the cognitive and affective features of humanness. However, in addition to these explicit markers of humanity, there are subtler implicit markers of "humanness". A large body of work suggests that human faces (and even bodies) evoke holistic processing. As a consequence, the denial of holistic processing, represents a denial of the perceptual features of humanness (Fincher & Tetlock, 2015).

People are particularly skilled at recognizing faces. A preference for face-like stimuli appears to be innate: newborns preferentially orient toward stimuli with face-like first-order relations (Johnson, Dziurawiec, Ellis, & Morton, 1991; Mondloch, Lewis, Budreau, Maurer, Dannemiller, Stephens, & Kleiner-Gathercoal, 1999). This innate face preference translates into heightened perceptual acuity in adults (Richler, Cheung, & Gauthier, 2011). Adults can hundreds, if not thousands of individuals quickly, as long as the presentation of the person is not disrupted by inversion or other manipulations (Maurer, Le Grand, & Mondloch, 2002).

These striking skills are all the more impressive when we consider that facial features are arranged in similar configurations on all human faces, which means that subtle differences in features and their spatial relations are necessary for discriminating among faces. To facilitate extraction of configural information, people process faces holistically, as evidenced by the fact that it is more difficult to ignore part of a face than part of an object (Farah, Wilson, Drain, & Tanaka, 1998; Maurer, Le Grand, & Mondloch, 2002; Young, Hellawell, & Hay, 1987).

The concept of holistic processing is a cornerstone of face-recognition research. Neuro-cognitive researchers have amassed convincing evidence that holistic processing is distinct from other forms of perceptual processing; certain regions of the brain are dedicated to holistic processing (Kanwisher, Tong, & Nakayama, 1998); and individuals with prosopagnosia show selective impairment in the holistic processing of faces (Ramon, Busigny & Rossion, 2010; Tanaka & Farah, 2003).

A recent body of research suggests that certain types of social information attenuate the holistic processing of faces of a large number of socially disfavorable groups (e.g. MacLin & Malpass, 2001, 2003). Most famously, the holistic facial processing is disrupted when observers view the faces of disadvantaged racial groups (e.g. Michel, Rossion, Han, Chung, and Caldara, 2006). Although a provocative finding given the large body of research on the mistreatment of individuals of other races, this Other Race Effect (ORE) is not necessarily due to social modulation of perceptual effects. Because the facial stimuli used in these studies inevitably differ as a function of race, race effects can be attributed to a number of bottom-up informational explanations.

However, recent findings suggest that these effects may be modulated by social motives[1]. Group affiliation may be in itself sufficient to elicit changes in processing as indexed by facial inversion (Bernstein, Young & Hugenberg, 2007), facial composite task (Hugenberg & Corneille, 2009), neural activity in the face selective region the fusiform face area (Van Bavel, Packer& Cunningham, 2011) and the N170 an ERP component associated with face-processing (Ratner & Amodio, 2013). Further, the attenuation of face-typical perceptual processing has been observed in reactions to sexualized females (Bernard, Gervais, Allen, Campomizzi, & Klein 2012) and subordinate social groups (Shriver, Young, Hugenberg, Bernstein, and Lanter, 2008).

Even more recently, in a series of studies examining the perceptual processing of norm violators, Fincher and Tetlock (2015) proposed a theory of Perceptual Dehumanization. Fincher and Tetlock take a social functionalist approach and argue that the facial processing of norm violators is selectively attenuated and that this attenuation in facial processing facilitates punitive behavior. This work builds upon classic accounts of dehumanization and suggests that perceptual dehumanization functions to facilitate the infliction of harm.

It is interesting to note that the attenuation of face-typical processing occurs in a broad range of circumstances, even in minimal groups (Hugenberg & Corneille, 2009; Van Bavel, Packer& Cunningham, 2011). This suggests perceptual dehumanization arises in situations where there minimal stigmatization or motivation to harm. One possibility raised by this pattern of

data is that perceptual dehumanization is linked more to the inhibition of helping than to the activation of aggression, the hallmark of dehumanization.

Distinguishing these two possibilities can be difficult. Most evolutionary and social-exchange-theory perspectives suggest that people are least inclined to help those seen as lacking moral character, norm violators of one form or another But there are instances when these two possibilities can be disambiguated. If our theoretical claim is correct, there are inter-group functions (military protection against external aggressors) that may require sacrificing valued in-group members. To protect the group as a whole, people must sometimes deny honored civil servants the concern normally accorded in-group members. For example, soldiers are voluntarily sent into harm's way to protect society's interests, ideals, and citizens. The welfare of these individuals is subordinated to the welfare of society at large.

We propose that in the cases of both honored civil servants and stigmatized groups, people use similar perceptual mechanisms to inhibit the helping response. Specifically, H1 posits that:

> If dehumanization acts to inhibit helping behavior, we should expect perceptual shifts in reactions not only to norm violators but also highly valued civil servants who are seen as "necessary to sacrifice" for the greater good.

The norm-enforcement prediction is the less controversial part of H1 and it has already been demonstrated on multiple occasions (Fincher & Tetlock, 2015). But the more controversial component of H1 has not been tested. This article will therefore focus on the effects of perceptual dehumanization on highly valued civil servants.

The socio-functionalist logic of perceptual dehumanization inhibiting helping for the greater good, suggests that perceptual dehumanization will facilitate utilitarian behavior. In the case of high-status but sacrificial actors, perceptual dehumanization will make sacrifices easier. H2 posits that:

> Impairments in face-specific processing should increase willingness to sacrifice individuals for the greater good.

This article tests two key functionalist claims derived from the theory of Perceptual Dehumanization: (1) perceptual dehumanization spontaneously occurs when aggregate social welfare requires indifference toward the well-being of the actor; (2) perceptual dehumanization facilitates behavioral responses inline with greater social welfare. Studies 1-4 use a multi-method array of techniques to test the breath of dehumanization by examining if individuals spontaneously attenuate perceptual processing of both norm violators and civil servants in high risk roles. Studies 5 and 6 examine whether these perceptual changes translate into behavioral changes.

Study 1

If dehumanization only facilitates violence, we should only observe perceptual shifts for low-status/stigmatized groups. But if dehumanization inhibits empathic concern, we should expect perceptual shifts not only for norm violators but also for highly valued civil servants who are seen as "necessary to sacrifice" for the greater good. To disentangle these possibilities we examined the degree to which three groups were perceptually dehumanized: police officers (who risked their lives to save others), convicts, and ordinary citizens.

Participants

Participants were 239 (127 females) undergraduates at a northeastern university completed the study in individual computer terminals and were each paid $12. The average age of participation was 20.1 (*SD* = 1.0). Participants reported that their political attitudes were liberal (*M* = 5.3 on a 7 point scale). Participants were recruited through a behavioral lab on campus. The study ran for 1 week and the number of sign-up volunteers during that time period determined sample size.

Methods

Stimuli. Computer generated faces, of average trustworthiness (see Todorov, Dotsch, Porter, Oosterhof, & Falvello, 2013) were used the memory task. Social category was

manipulated by presenting the faces from the chest up, dressed in either a police uniform, a convict uniform or plain blue t-shirt – faces were randomly assigned to social group.

Procedure. We used a recognition memory task to measure perceptual dehumanization. The key manipulations were the social category with which the face was associated (police, citizen, criminal) and the orientation of the face (upright, inverted).

For each participant, the experiment consisted of eight blocks, each consisting of 10 face–name pairings. In four blocks, faces appeared upright during both the study and test phases; in four blocks, the faces appear as inverted during both the study and test phases. To control for difficulty or learning effects, the order of blocks was randomized across participants. Names were randomly assigned to faces. Face-name pairings were randomly assigned to blocks. Names were taken from the social security websites 100 most common names of 1988.

Each block consisted of a study phase and a test phase. During the study phase, the 10 face-name pairings were shown in a random order for 12.5 seconds each. During the test phase, names were shown in a random order below an array consisting of all 10 faces. Participants were asked to identify the correct face from the array by indicating the number associated with the face. Face arrays were created by randomly assigning each of the 10 faces a number.

Results

We conducted a 2 (orientation: upright, inverted) X 3(group: police, citizen, criminal) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 6 group-face combinations. As shown in Figure 2.1, results replicated the face inversion effect. Participants were more accurate at identifying upright (*M*= .76, *SD*= .12) than inverted faces (*M*= .47, *SD*= .15), $F(1,232)=165.5$, $p<.001$, $\eta_p^2 = 1.12$. People were also significantly more accurate at identifying face name pairings for police (*M*= .63, *SD*=.14) and criminals(*M*= .66, *SD*=.14) than ordinary citizens(*M*= .56, *SD*=.16), $F(2,232)=5.28$, $p=.006$, $\eta_p^2 = .18$.

The hypothesized interaction between orientation and group also emerged, $F(2,232)=12.31$, $p<.001$, $\eta_p^2 = .29$. Participants were less accurate at identifying inverted faces

paired with ordinary citizens than inverted faces paired with police officers, $t(232) = 3.6$, $p < .001$ or criminals $t(232) = 7.4$, $p < .001$. However, they were not more accurate at identifying upright faces paired with police officers, $t(232) = .54$, $p = .71$. or convicts, $t(232) = .892$, $p = .18$. The reduction in the face-inversion effect when faces for both police and criminals suggest that perceptual dehumanization occurs for both categorizes of individuals.

Criminals elicited greater perceptual dehumanization effects than did police officers. We conducted a 2 (orientation: upright, inverted) X2 (group: police, citizen) repeated measure analysis of variance (ANOVA) using the average response accuracy for the 4 relevant group-face combinations. The interaction between orientation and group was significant, $F(2,232)=8.07$, $P=.005$. Participants were more accurate at identifying inverted faces paired with police than criminals $t(232) = 2.07$, $p=.02$, but not more accurate at identifying upright faces paired with police $t(232) = .89$, $p = .18$.

Discussion of Study 1

In Study 1 we observed perceptual shifts not only for norm violators (replicating past work) but also civil servants seen as "necessary to sacrifice" for the greater good. The reduction in the facial inversion effect for both cops and convicts suggests that participants were no longer processing the faces of either group as they process other human faces. This pattern of results suggest that dehumanization, or at least a denial of perceptual humanness, is rooted in the inhibition of concern rather than motivating harm. Although the specific mechanisms underlying the facial inversion effect remain a topic of active debate (Young, Hellawell, & Hay, 1987), from a social psychological perspective, it is the atypicality that matters most, not the exact character of the perceptual mechanism.

Interestingly, police officers were not perceptually dehumanized to the same degree as criminals. This may be a property of the particular stimulus or suggest that inhibitions of helping and harming result in different degrees of perceptual dehumanization.

Study 2

Study 1 found that people perceptually dehumanized both police and criminals. Study 2 addresses two potential confounds: (1) the dehumanization of police could be due to a carryover effect of negative attitudes toward government (Nisbett & Wilson, 1977); (2) the dehumanization of both police and convicts could be triggered by their uniforms (Diener, Dineen, Endresen, Beaman, & Fraser, 1975; Haney, Banks, & Zimbardo, 1973; Rehm, Steinleitner, & Lilli, 1987; Zimbardo, 1969). Study 2 corrects these problems in two ways. Instead of using police offices, the study uses Army officers—and instead of using ordinary individuals as a control, we used uniformed government employees in a low risk job (thus controlling for the effect of uniforms). In order to provide converge validity, Study 2 manipulates holistic processing through offsetting the faces.

Participants

Participants were 227 (115 Male) workers on Mechanical Turk who participated for a $5.00 payment. The sample was constrained to be American to reduce ambiguity in social symbols. The average age of participation was 40.7 (*SD*=11.9), lower-middle class (*M*=2.4 on a 5 point scale), and slightly liberal (*M*=4.4 on a 7 point scale).

Methods

Stimuli. We again used computer generated faces of average likability and trustworthiness (see Todorov, Dotsch, Porter, Oosterhof, & Falvello, 2013). Faces were randomly assigned to a social category was manipulated by presenting the faces from the chest up, dressed in either a military uniform, a convict uniform or postal officer uniform. Half of the faces were offset, so that the top and bottom half of the face were misaligned by 250 pixels.

Procedure. We used a similar memory task to measure perceptual dehumanization. The manipulations of interest were the social category with which the face was associated (soldier, postal worker, criminal). Visual processing was manipulated using alignment of the face (intact, offset).

For every participant, the experiment consisted of eight blocks, each consisting of 6 face–name pairings. In four blocks, faces appeared intact during both the study and test phases; in four

blocks, the faces appear as offset during both the study and test phases. To control for difficulty or learning effects, the order of blocks was randomized across participants. Names were randomly assigned to faces. Face-name pairings were randomly assigned to blocks. Names were taken from the social security websites 100 most common names of 1992.

Each block consisted of a study phase and a test phase. During the study phase, the 6 face-name pairings were shown in a random order for 9 seconds each. During the test phase, names were shown in a random order below an array consisting of all 6 faces. Participants were asked to identify the correct face from the array by indicating the number associated with the face. Face arrays were created by randomly assigning each of the 6 faces a number.

Results

We conducted a 2 (alignment: offset, intact) X 3(group: soldiers, postal worker, criminal) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 6 group-face combinations. Results replicated the effects in Study 1. Participants were more accurate at identifying intact (*M*= .64, *SD*= .17) than offset (*M*= .51, *SD*= .19) faces, $F(1,223)=9.97$, $P<.001$, $\eta_p^2 = .27$. By contrast, participants were not significantly more accurate at identifying face name pairings for soldiers (*M*= .57, *SD*= .12), criminals(*M*= .59, *SD*= .12) or United States Postal Service Employees (*M*= .54, *SD*= .12), $F(2,223)=.665$, $P=.423$.

The hypothesized interaction between alignment and group also emerged, $F(2,232)=29.940$, $p<.001$, $\eta_p^2 = .32$. Participants were less accurate at identifying offset faces paired with postal workers than offset faces paired with soldiers $t(226) = 4.67$ $p < .001$ or criminals $t(226) = 4.6$, $p < .001$. However, they were not more accurate at identifying intact faces paired with soldiers $t(226) = .42$, $p = .21$. or criminals $t(226) = .11$, $p = .42$. The clear reduction in the alignment effect when faces were associated with either protectors or perpetrators of the social order suggests that participants were processing the faces of protectors or perpetrators differently from those of other human faces.

Discussion of Study 2

As with the results of Study 1, the results of Study 2 supports Hypothesis 1; perceptual shifts occurred for both norm violators and norm upholders who are sacrificed for the greater good.

The results of Study 2 expand on Study 1 in important ways. Using U.S. postal employees controls for both the effect of governmental attitudes and the effect of uniforms. Moreover, offsetting is a more direct manipulation of holistic processing as demonstrated by the facial composite task. The composite task separating the two halves of the face and recombining them to create a new face must. Individuals perceive the face, as an entirely new face, when the face is intact. However, when the two halves are offset, individuals are able to recognize these parts as familiar. On purely logically grounds, this suggests that offsetting provices a face-valid manipulation of holistic processing (McKone & Robbins, 2014).

Study 3

Studies 1 and 2 demonstrate the perceptual dehumanization of police and army officers. But these results could still be due to a negative view toward authority. Although Study 2 attempted to control for attitudes toward government by using a group of governmental officials in the control condition, postal officer may not represent authority (or oppressive governmental regimes) to the same degree as do police and army officers. Study 3 addresses this objection by assessing attitudes toward governmental authority.

Attitudes towards police officers and convicts were assessed on several dimensions. The stereotype content model suggests two dimensions of traits: warmth and competence. Fiske and colleagues argue that dehumanization only occurs when individuals are both low warmth and low competence (Fiske, Cuddy, Glick & Xu, 2002; Harris & Fiske, 2006). In addition to warmth and competence moral character is also assessed. Goodwin, Pizza and Rozin (2013) have shown that moral character is more useful in predicting affiliative motivations than warmth. Therefore, stigmatization may be due to perceived immorality. To control for this possibility, we also include a measure of moral character as well

Participants

Participants were 235 (137 Male) workers on Mechanical Turk who participated for a $5.00 payment. The sample was constrained to be American to reduce ambiguity in social symbols. The average age of participation was 37.4 (*SD*=12.2), lower-middle class (*M*=2.3 on a 5 point scale), and slightly liberal (*M*=4.6 on a 7 point scale).

Method

We used the same recognition memory task as study 1 to measure perceptual dehumanization. Each block consisted of a study phase and a test phase. During the study phase, the 10 face-name pairings were shown in a random order for 12.5 seconds each. During the test phase, names were shown in a random order below an array consisting of all 10 faces. Participants were asked to identify the correct face from the array by indicating the number associated with the face. Face arrays were created by randomly assigning each of the 10 faces a number.

Participants then rated their attitudes toward the police and convicts, relative to the average person, on a 7 point Likert scale ranging from “a lot below average” to “a lot above average. The 16 randomized-order traits were drawn from 4 different categories: competence (organized, intelligent, athletic, clever), warmth (sociable, easy-going, warm, outgoing), high-character/low warmth (courageous, principled, honest, loyal), high-character/high warmth (kind, giving, cooperative, helpful).

Results

We conducted a 2 (orientation: upright, inverted) X 3(group: police, citizen, criminal) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 6 group-face combinations. Results replicated the face inversion effect --participants were more accurate at identifying upright than inverted faces, $F(1,232)=97.36$, $p<.001$,$\eta_p^2 = 1.02$. The hypothesized interaction between orientation and group also emerged, $F(2,232)=14.65$, $p<.001$, $\eta_p^2 = .26$.

Importantly, the dehumanization of police officers does not appear to be driven by stigmatization. On all dimensions, attitudes towards police officers appear to be positive. Police officer were viewed as being of average warmth (*M*=3.4), 95% CI[3.17, 3.64] and were significantly above average on moral character/high warmth(*M*=3.9), 95% CI [3.64, 4.10], moral character/ low warmth (*M*=4.47), 95% CI[4.24, 4.69] and ability (*M*=4.45), 95% CI[4.23,4.26]. None of these traits related were significant covariates or attenuated the effects of perceptual dehumanization.

By contrast, the dehumanization of convicts appears to be driven by stigmatization. On all dimensions, attitudes towards convicts appear to be negative. Convicts were viewed as significantly below average on warmth (*M*=3.26), 95% CI[3.08, 3.45], moral character/high warmth(*M*=2.65), 95% CI[2.41, 2.90], moral character/ low warmth (*M*=2.37), 95% CI[2.12, 2.62] and ability (*M*=3.12), 95% CI[2.85, 3.39]. Importantly, moral traits were a significant covariate for moral (cold) $F(2,232)=7.59$, $p=.006$ and $F(2,232)=4.16$, $p=.042$. This reduced the significance of the orientation by person interaction $F(2, 232) =.411$, $p=.63$ for convicts relative to citizens.

Discussion of Study 3

In Study 3 we again observed perceptual shifts for both highly valued civil servants and norm violators. Importantly, the pattern of results suggests that the perceptual dehumanization of police officers is not due to stigmatization. Warmth, competence and moral character did not predict the attenuation of face processing for police officers whereas moral character attributions appeared to mediate perceptual effects of convicts. One possibility raised by this pattern of results is that different mechanisms underlie the perceptual dehumanization of police and convicts.

Study 4

Studies 1, 2, and 3 demonstrate the perceptual dehumanization of police and army officers; however, these results might still be driven by a negative view toward authority. The functionalist hypothesis we advance suggests that this is due to a need to cope with the potential

harm, which may befall them. In Study 4, we directly test whether the perceptual dehumanization of Army officers is due to the risk associated with their jobs.

Secondly, thus far it can be argued that effects are based in recall, not recognition. Study 4 uses a more traditional perceptual matching task -- the Face Composite Task (FCT). In the FCT two faces are split horizontally and combined. It's easier to identify the top half-face when it's misaligned with the bottom one than when the two halves are fitted smoothly together(Young et al., 1987). This is because the impression of the composite image is a novel face that does not resemble the original person depicted in the top or bottom portion of the image.

If participants are processing the face holistically, they are unable to focus on just the top half of the face. However, when the top and bottom half are misaligned, participants can recognize both the top and bottom half of the face.

Method

Participants. Participants were 207 (101 Male and 106 Female) students at a northeastern university who participated in exchange for payment. Data was collected over a one-week period in the Wharton Behavioral lab. Sample size was determined by signup. The average age of participation was 20.5 (stdev .9).

Stimuli. We again used computer generated faces of average likability and trustworthiness (see Todorov, Dotsch, Porter, Oosterhof, & Falvello, 2013). Faces were randomly assigned to a social category was manipulated by presenting the faces from the chest up, dressed in either a military uniformAll faces were approximately 180 pixels wide and 250 pixels high and were fitted onto a 256 x 256 pixel gray background. Pairing each target top part with a bottom part from another individual created composite faces. In order to ensure same and different trials were identical, randomly paired top and bottom parts from different individuals to form both the study and test stimuli. Each of the 16 target top parts appeared approximately once in each condition.

Procedure. Subjects performed a perceptual matching task in which they indicated when the top half of two faces matched. The task is illustrated in Figure 2.2. Prior to each trial of

the perceptual matching task participants, learned where the solider they were about to see was stationed. The solider was stationed at either a high-risk job (e.g. Dylan Diffuses bombs in Hemland, Afghanistan) or a low-risk job (e.g. Dylan Coordinates supplies at Fort Still in Oklahoma).

Participants then performed a perceptual recognition task. To ensure participants associated the face with the soldier's location, the name of the actor appeared below the face (e.g. "Dylan"). Each trial began with the display of an the soldier's post on screen for 2800ms. Following a 500ms interstimulus interval, a face appeared on screen for 400-ms. After a 1000-ms interstimulus interval, the sample face appeared for 800 ms. To avoid subjects comparing a specific location of the display to perform the matching task, the target and sample faces appeared at slightly different screen locations. In half of the trials both the top and bottom half of the target and sample face were aligned. In half of the trials both the top and bottom half of the target and sample face were misaligned.

Participants had 750 ms to decide, as fast and accurately as possible, whether these were the same or different. The participants expressed their choice by pressing a left versus right key on a keyboard placed in front of them. Same-aligned and same-misaligned faces appeared twice as target faces: once in a "same" trial, once in a "different" trial. Target and sample faces always differed with regard to their bottom part. In half of the trials, the top parts were identical ("same"). In the other half, both top and bottom parts differed ("different"). High and low risk jobs, as well as aligned and misaligned trials were randomly interleaved. The experiment comprised 64 experimental trials randomly mixed up across subjects (See figure 2.2 for a visual depiction of the task).

Results

Results of study 4 were largely consistent with our predictions. We conducted a 2 (alignment: intact, offset) X 2(Post: high risk, low risk) repeated measure analysis of variance (ANOVA) using the sensitivity index for each of the 4 act-face combinations. As shown in Figure 2.3, participants showed greater sensitivity at recognizing intact (M=.91, SD=1.3) than offset

(*M*=.46, *SD*=1.1) faces *F*(1,200)=135.2, *p*<.001, η_p^2= 1.14. Participants were non-significantly more sensitive at identifying faces paired with high risk than with low risk post *F*(1,200)=2.076, *p*=.15. However, there was a significant interaction between post and alignment, *F*(2, 199)=28.2, *p*<.001, η_p^2= .28. When the post was high risk, participants did not show differential sensitivity to intact faces (*M*=.44, *SD*=1.3) than to offset faces (*M*=.66, *SD*=1.3), *t*(52) = .48, *p* =.83, *d'*= .17. When the post was low risk, participants showed greater sensitivity to offset faces (*M*=1.42, *SD*=1.3) than intact faces(*M*=.34, *SD*=1.1) , *t*(52) = 5.43, *p* <.001, d'= .86.

Discussion of Study 4

The functionalist hypothesis suggests army officers are perceptually dehumanized in order to cope with the potential harm—and that this result is linked to the perceived riskiness of these jobs. When the risk associated with each job is manipulated, only the individuals facing risk are perceptually dehumanized. Because study 4 uses a perceptual matching task the results therefore clearly suggest an attenuation in holistic processing.

Importantly, Study 4 uses the Facial Composite Task. The composite task is considered a gold standard for assessing holistic process because, unlike the facial inversion task, the composite task does not simultaneously manipulate 1st and 2nd order spatial relationships. Separating the two halves of the face and recombining them to create a new face must, on purely logically grounds, impairs holistic processing (McKone & Robbins, 2014). For these reasons, the facial composite task provides the most direct evidence that the disruption of holistic processing is the underlying mechanism of impairment.

An interesting aside is that this pattern of results suggests participants are misperceiving risk. The dehumanization of these social groups is driven by a misperception of their risk of death. The actual risk typically associated with being a police officer or solider has been less than 1 in 100 per year over the last 40 years. Yet the patterns of perceptual dehumanization suggest that individuals judge the risk as relatively high (the perceptual dehumanization of soldiers with undefined levels of risk levels were similar to those in high risk jobs). Consistently,

in follow up work, when we asked participants they dramatically over-estimated the risk of death for soldiers (it was upward of 30%).

Study 5

When applying a functionalist approach to perceptual dehumanization, it is essential to understand the behavioral changes produced by perceptual dehumanization. Prior work has already repeatedly documented that the dehumanization of convicts facilitates punitive behavior (Fincher & Tetlock, 2015). Therefore, we explore the behavioral changes that perceptual dehumanization induces for positive figures, specifically, military personnel. Our theory predicts that the perceptual dehumanization of these laudable targets will increase indifference toward their well being. We test participants' willingness to trade soldier's lives for the broader goals of combatting terrorist activity.

Method

Participants responded to one of three real world moral dilemmas. Each dilemma pitted the utilitarian goals of reducing terrorist activity and identifiable victims against each other. In the three dilemmas participants indicated how large a ransom they would pay to rescue a group of solider kidnapped by a terrorist organization, which raises money to fund al Qaeda. Although the soldiers would be returned upon receipt of the ransom, the money would be used to subsidize terrorist activity.

Participants viewed one of the three scenarios. The number of victims was randomly determined to be two or twenty. In all cases, the face of a single identifiable victim was shown. The face appeared either upright or inverted.

After reading the scenario and viewing the identified victim, responses were elicited. Participants were first told the range of pervious ransom which had been paid. After reading this information, participants were asked "what is the maximum ransom you are willing to pay to rescue the hostages".

Results

We conducted a 2 (orientation: upright, inverted) X 3(number of victims) analysis of variance (ANOVA), on the log of reported ransom payments. As shown in Figure 2.4, people were willing to pay significantly more for 20 soldiers (*M*=5,367,090, *SD*=4565651) than two soldiers (*M*=1,616,803.95, *SD*=1,935,191), *F*(1,595)=51.3, *p*<.001,η_p^2 = .43. . In line with our predictions, facial inversion reduced willingness to help. Ransoms for inverted faces were significantly lower (*M*=2,956,036, *SD*=3,644,050.63) than ransoms for upright faces (*M*=3,869,492 *SD*=4,246,301) *F*(2,594)=9.24, *p*<.002, η_p^2 = .21. There was no significant interaction between the number of lives saved and facial orientation, *F*(2,594)=.67, *p*=.512.

Discussion of Study 5

Whereas Study 4 found that the perceptual dehumanization of soldiers was linked to the perceived risk to their lives, Study 5 found, as predicted, that these spontaneous perceptual changes translated into behavioral changes. The attenuation in face specific processing increased willingness to sacrifice soldiers for the greater good.

Study 6

Study 5 manipulated facial processing using the facial inversion effect. In Study 6, we use the technique of offsetting the top and bottom half a face to disrupt configural processing.

Method

Participants responded to a moral dilemmas based upon real world events. Each dilemma pitted the utilitarian and identifiable victim(s) against each other. All three dilemmas asked participants how large a ransom they would willing to pay, to rescue kidnapped victims. Importantly, the victims were kidnapped by a terrorist organization. Although they would be returned upon receipt of the ransom, the money would be used to subsidize terrorist activity.

Participants received one of three scenarios. In all cases, the face of a single identifiable victim was shown. The face appeared either intact or offset. After reading the scenario and viewing the identified victim, responses were elicited. Participants were first told the range of

pervious ransoms paid for similar number of victims. After reading this information, participants were asked "what is the maximum ransom you are willing to pay to rescue the hostages".

Results

We conducted a 2 (display: intact, offset) analysis of variance (ANOVA) using the log of reported ransom payments. Inline with our predictions, results suggested facial offset reduced willingness to help. Ransoms associated with offset faces were significantly lower (*M*=2,938,418, *SD*=3,558,202.62) than ransoms associated with intact faces(*M*=4,317,343.10, *SD*=7,284,181), $F(2,522)=8.2$, $p=.004$, $\eta_p^2 = .20$.

Discussion of Study 6

The results of Study 6 conceptually replicate those of Study 5 by using a different manipulation of holistic processing. The pattern of results reinforces the conclusion that an attenuation in face specific processing increased willingness to sacrifice soldiers for the greater good. Consistent with the functionalist logic, which posits that these actors are perceptually dehumanized to buffer observers from the emotional pain of losing them.

General Discussion

This paper combines past theoretical accounts of dehumanization with modern work on perceptual categorization to explore the social function of attenuations in face typical processing. Studies 1-4 use a multi-method array of techniques to produce convergent evidence that the visual mechanisms that enable the processing of faces are inhibited in situations where individuals are required to suppress desire to help an identified individual.

In Study 1 and 2 we document perceptual shifts for civil servant who are seen as "necessary to sacrifice" for the greater good. Study 3 builds upon this by positing that the dehumanization of police officers is not driven by disgust, moral condemnation or other processes linked to classic dehumanization. Study 4 directly tests the functionalist logic by demonstrating that the perceptual dehumanization of Army officers is due to the perceived riskiness of these

jobs. When job risk is manipulated, only the individuals facing high risk are perceptually dehumanized.

Finally, Studies 5 and 6 show that these perceptual changes translate into to behavioral changes. In line with our predictions, an attenuation in face specific processing increased participants' willingness to sacrifice soldiers for the greater good. We use a real life utilitarian dilemma world governments face, to examine if perceptual processes facilitate the devaluation of the lives of soldiers. In line with our predictions, an attenuation in face specific processing increased participants' willingness to sacrifice soldiers for the greater good (it reduced participants willingness to ransoms to terrorist organizations). Optimistically, this research may suggest a strategy for certain nations to avoid paying terrorist ransom.

These results raise the question does perceptual dehumanization function specifically to facilitate consequentialist thinking? One way to test this possibility would be to examine perceptual dehumanization in situations, such as the trolley problem, where there are competing moral principles. Because the trolley problem pits utilitarian and deontological rules against one another, one could establish if perceptual dehumanization facilitates participants adhesion to their own moral rules, or functions more specifically to support utilitarian principles. That said, the victims of utilitarian action are more salient than the victims of deontological action (e.g. a single victim, harmed through commission, target of attention). This would suggest that even if perceptual dehumanization can occur in both situations, it is more likely to be elicited by utilitarian thinking.

Within psychological research, dehumanization is defined as the denial of our humanity. Not surprisingly, dehumanization has raised substantial psychological interest. The paradigmatic form of dehumanization is the Nazi who hates Jews and wants to exterminate them. There is an existential conflict, the groups cannot coexist and one group must be terminated. The paradigmatic form of infrahumanization is that the two groups are making clashing claims on each other's resources. Infrahumanization reduces the need take another's perspective.

The third situation represented by perceptual dehumanization represents a more pervasive and automatic form of dehumanization. Dehumanization is defined "the denial of humanness" (Haslam, 2001). Perceptual dehumanization is the attenuation of perceptual processes typically evoked by human faces. Therefore, based upon the popular definition, perceptual dehumanization is a form of dehumanization. Although perceptual dehumanization is a less socially charged way of denying the features of personhood, it nonetheless denies one aspect of the typical response evoked by persons.

One advantage of perceptual dehumanization is that it is in principle value free. Unlike past conceptions of dehumanization, perceptual dehumanization is not due to stigmatization or negative attitudes. It might apply to those who are promoted above human status (e.g. heroes, gods) or demoted below human status (e.g. criminals). Defining dehumanization in a way that does not rely on value laden language is a sharp departure from previous work and it highlights the complexity of dehumanization as a psychological construct that can operate at both automatic, unconscious levels and at conscious, volitional levels. As indicated in Table 2.1, perceptual dehumanization is a pervasive process that can be activated or deactivated by situational cues. When switched on, normal reactions to harm are muted. If perceptual dehumanization is not elicited by stigmatization, it raises the interesting question how is this process turned on.

Although visual depictions of dehumanization have existed for much of human history, previous work has not linked social forms of dehumanization to perceptual processing. Our results highlight previously experimentally unexplored connections between social-functionalist theories of dehumanization and face perception. Our data suggests that perceptual dehumanization supports both intra-group functions (norm enforcement/policing) and inter-group functions (military protection against external aggressors) that may require sacrificing valued in-group members. The pattern of data supports the theoretical claim that the holistic processing of faces is attenuated by social facts in a manner that serves the formation of cooperative, non-kin

based communities. This suggests that adaptations to group life may be internalized at a basic level of cognition.

CHAPTER 3

Avoiding eye contact (perceptually) dehumanizes: Visual attention mediates the social modulation of holistic processing

Faces, unlike most visual stimuli, elicit holistic processing and as a result, are one of the best examples of a high-level visual "module" (Haxby, Hoffman & Gobbini, 2000, 2002; Kanwisher, 2002; Kanwisher & Yovel, 2006). Modular accounts of face processing suggest that the holistic processing module becomes mandatorily engaged whenever presented with a face (e.g., Allison et al. 1995; Farah et al. 1995). Although this has marked computational benefits (Giraud & Poeppel, 2012), a consequence of stimulus driven modularity is that higher-order factors, such as social information, should not influence perception.

Problematically, an emerging body of social-cognitive work indicates that the attenuation of face processing can occur on the basis of purely social information (Kelly, Quinn, Slater, Lee, Ge & Pascalis, 2007; Michel, Rossion, Han, Chung, & Caldara, 2006; MacLin & Malpass, 2001, 2003). Given the strong, convergent evidence supporting some form of face processing modularity (see Calder, Rhodes, Johnson & Haxby, 2011 for a comprehensive review), the top-down attenuation of face processing raises important questions about how one engages and

disengages perceptual modules. We examine if interactions among discrete cognitive systems can accounts for the influence of social processes on perceptual ones. Specifically, we tests the degree to which attentional processes bring about socially induced changes in face perception.

People perceive faces holistically or as integrated precepts (Maurer, Le Grand, Mondloch, 2002). This allows people to discern subtle differences in facial features and their spatial relations (Richler, Cheung & Gauthier, 2011). As such, people find it is more difficult to ignore part of a face than part of an object (Farah, Wilson, Drain, & Tanaka, 1998), people are better at identifying features in the context of the whole face than in isolation (Tanaka & Farah, 1993) and recombining the top and bottom halves of faces produces the illusion of novel face components (Carey & Diamond, 1994; Hole, 1994; Young, Hellawell, & Hay, 1987).

There are two competing modular accounts that explain the marked skills associated with face processing. The specific or encapsulated modularity account suggests that holistic processing developed to facilitate the processing of faces and that only face stimuli elicit holistic processing (Haxby, Gobbini, Furey, Ishai, Schouten & Pietrini, 2001; Haxby, Hoffman & Gobbini, 2002; Kanwisher, Downing, Epstein, & Kourtzi, 2001; Treisman, & Kanwisher, 1998). This argument builds upon the premise that as a highly social species, facial recognition is particularly important to humans and therefore humans (and some primates) have acquired specialized mechanisms to recognize other's faces (Haxby, Hoffman & Gobbini, 2002). Research from cognitive psychology (e.g. Bruce, Doyle, Dench & Burton 1991; Tanaka & Farah, 1993), computational vision (e.g. Turk & Pentland, 1991), neuropsychology (e.g. Damasio, Tranel & Damasio, 1990; Behrmann, Winocur & Moscovitch, 1992), and neurophysiology (e.g. Desimone, 1991; Perrett, Hietanen, Oram, Benson & Rolls, 1992) suggests that face and object recognition involve qualitatively different processes that occur in distinct areas of the brain. Consistently, inter-cranial recordings from macaques and human epilepsy patients, and patients with localized brain damage in the occipitotemporal region suggest a cortical specialization of face processing (Gross, Rocha-Miranda & Bender, 1972; Haxby, Grady, Horwitz, Ungerleider, Mishkin, Carson, et al., 1991; Desimone, 1991; Perrett et al., 1991; De Renzi, 1997).

The domain general or unencapsulated modularity account (typically call the expertise theory) suggests that holistic processing represents a more general strategy and is evoked by stimuli with which individuals have perceptual expertise (Bukach, Gauthier & Tarr, 2006). Studies supporting this domain-general or expertise argument demonstrate that the skilled individuation of homogeneous non-face categories, such as birds, cars, dogs, and even novel object classes such as Greebles recruit putatively face-specific cognitive and neural mechanisms (Gauthier, Skudlarski, Gore & Anderson, 2000; Gauthier, Tarr, Anderson, Skudlarski & Gore, 1999). This suggests that holistic processing could theoretically occur across an unbounded number of categories if the viewer has perceptual expertise and the targets require within category discrimination of complex stimuli (Diamond & Carey, 1986; Gauthier, & Tarr, 1997; Gauthier, Williams, Tarr, & Tanaka, 1998).

One of the earliest problems for modular conceptions of face processing was the Other Race Effect (ORE). It has long been acknowledges that people are better at discriminating and recognizing faces of their own race than faces of a different race (for a meta-analysis, see Meissner & Brigham, 2001). More recent research documents that people are better able to differentiate faces based on the distinctiveness of their features and their configuration (i.e. the spatial relations between the features) for faces of their own race that faces of a different race (Michel, Corneille & Rossion, 2007; Michel, Rossion, Han, Chung & Caldara, 2006; Tanaka, Kiefer & Bukach, 2004).

Importantly, the Other Race Effect (ORE) is not necessarily due to social modulation of perceptual effects. Stimuli differ across races; therefore, one can attribute the effects of race on perceptual processing to a number of bottom-up explanations consistent with either form of modularity. The expertise theory explains face specific processing by suggesting that people have different exposure to faces of different races. Because people have more experience with faces of their own race, they have greater visual expertise (e.g., Rhodes, Tan, Brake, & Taylor, 1989; Sangrigoli, Pallier, Argenti, Ventureyra, & de Schonen, 2005). Alternatively, the perceptual

narrowing accounts suggests that the determination of which stimuli are “faces” is flexible during infancy and therefore adults only consider same-race faces “faces” (McKone & Robbins, 2007).

However, both forms of modularity require that “face” stimuli elicit holistic processing. Therefore they cannot account for recent work, which has shown that purely social information can attenuate the holistic processing of faces. For example, research suggests the attenuation of holistic processing in both intra-group and minimal group context (Bernstein, Young & Hugenberg, 2007; Kelly, Quinn, Slater, Lee, Ge & Pascalis, 2007; MacLin & Malpass, 2001, 2003). In these paradigms, the stimulus features of the face cannot account for differences between groups, because faces are randomly assigned to each group or counterbalanced across groups. Changes in facial processing due to group affiliation have been indexed by facial inversion (Bernstein, Young & Hugenberg, 2007), facial composite (Hugenberg & Corneille, 2009), neural activity in the fusiform face area (Van Bavel, Packer& Cunningham, 2011) and the N170 an ERP component associated with face-processing (Ratner & Amodio, 2013). Fincher and Tetlock call the attenuation of putatively face-specific processes “perceptual dehumanization.” They suggest that perceptual dehumanization functions broadly as a mechanism for inhibiting helping behavior and argue perceptual changes facilitate social behavior.

Problematically, this work has failed to acknowledge the problems social-perceptual effects pose for modularity. It has similarly failed to specify alternative mechanisms through which perceptual dehumanization might occur. One possibility, implied by the lack of a mechanism, is that social motivational processes alter perceptual directly. This is consistent with the “new look”, where Bruner (1947, 1954, 1999) argued that perceptual categorization is defined based upon social processes.

However this opposes traditional models of face processing. This is incompatible with encapsulated modularity because encapsulated modularity suggests holistic processing is active by faces and faces are defined based upon their visual properties. This thesis is also incongruent

with the expertise hypothesis. Although expertise suggests that stimuli other than faces can elicit holistic processing, because individuals have "expertise" in faces, a given face should always (or never) elicit holistic processing. Given the strength of the evidence which suggests face processing is modular (be it encapsulated or unencapsulated), it seems unlikely the attenuation face processing is instantiated at the perceptual level (see Calder, Rhodes, Johnson & Haxby, 2011 for a full summary of the evidence).

In this paper, we build upon a Gestalt theoretical perspective to provide an alternative explanation. The Gestalt view suggests that multiple psychological processes act in tandem and as a result we perceive the world as an integrated precept. This precept is not a perfect reflection of reality, but rather a biased perception formed in a top-down manner by many features of situation (Asch, 1946). For example, work by Asch and Zukier (1984) suggests that prior knowledge can bias attention and alter the judgment of traits (therefore changing how a person is perceived). We suggest social processes can also direct visual attentional and thereby alter face perception.

Selective attention can modulate the transmission of information during the early stages of sensoriperceptual analysis (Moran & Desimone, 1985). Numerous studies report that selective attention modulates perceptual processing during the first 200 miliseconds of stimulus processing in a gain-control fashion (see Hillyard, Vogel, & Luck, 1998 for a review). That is, control operations (e.g. selective attention and working memory), increase or decrease the transmission of information during the early stages of sensoriperceptual analysis within perceptual structures. Therefore, despite the modular nature of the FFA (i.e., its functional specificity and anatomic localization), face processing in this region depends on voluntary attention as indexed through FFA activation and N170 response (Sreenivasan & Jha, 2007; Sreenivasan, Goldstein, Lustig, Rivas & Jha, 2009; Wojciulik, Kanwisher & Driver, 1998)

Research examining the intersection of attention and perceptual processes typically focuses on covert attention—our ability to internally direct attention without changing our gaze. In

the present work, we are interested in how social information may change the manner in which participants interact with their environment. Therefore, we are interested in both overt and covert forms of selective attention. A classic indicator of overt attention is visual fixation (Duncan, 1984). Allocating attention to a position in space results in faster and more accurate processing of luminance and information in a region of space surrounding that location (Bashinski & Bacharach, 1980; Downing, 1988; Hoffman & Nelson, 1981). Therefore, if attention alters face processing, gaze patterns should reflect these changes.

Importantly, although face processing occurs relatively quickly, past work suggests that deviate gaze may attenuate that holistic processing of faces. Autistic patients, who show impaired holistic processing, show abnormal eye fixations patterns (Pelphrey, Sasson, Reznick, Paul, Goldman & Piven 2002). Furthermore, work by Blais and colleagues (2008) demonstrates that different patterns of fixation may underlie the emergence of other race effects in infants.

This paper test the hypothesis that the ‘‘top–down’’ modulation of face-specific processing occurs through changes in attention. Five studies examine whether changes in visual attention drive underlie the effect of social information of face perception. Study 1 uses eye tracking to test if social information leads to voluntary changes in visual attention. Study 2 tests if the pattern of gaze used to process unintentionally harmful actors (i.e. socially neutral actors) in Study 1, remove the effects of Perceptual Dehumanization. Study 3 examines if the pattern of gaze used to process intentionally harmful actors (i.e. socially negative actors) in Study 1, leads to an attenuation in the holistic processing. Study 4 examines if these attentional effect underlie the other race effect as well. Finally, study 5 examines if visual attention towards faces, effects punitive behavior.

Study 1

Past research suggests that the spatial attention system operates through visual fixations (Eriksen & Hoffman, 1973; Posner, 1980; Posner, Nissen, & Ogden, 1978). Although face

perception occurs on a rapid time scale, even when indexed through visual fixations, spatial attention plays an important role. In Study 1 we index visual fixations for the processing of norm violator's faces.

Of the effects reported in the literature, norm violators show the greatest attenuation of holistic processing. In order to control for negative affect or other variability across conditions we chose to use unintentional, but otherwise identical harms as our control condition. Past work on suggests that only intentional harms are viewed as blame worthy and elicit perceptual dehumanization. We predict the perpetrators of intention harm will be associated with a more featural pattern of visual fixations than the perpetrators of unintentional harm.

Participants

Sixty-Six students (23 males; age range 18-28, M=23.3, SD.=2.7) at the University of Pennsylvania participated in the study. All participants had normal or corrected-to-normal vision. All provided informed consent and were paid for their participation.

Stimuli and Apparatus

Stimuli. Stimuli were thirty two white male face stimuli from the Chicago Face Database (Ma, Correll, Witenbrink, 2015). Images were cropped to 250 × 350 pixels and converted to grayscale.

The stimulus exposures and response recording were controlled using SMI BeGaze Eye Gaze Software. Eye-movements were recorded using a Tobii® 1750 eye-tracker, which has no interference with the user environment of the experimental participants and gives freedom of head movement. Participants were calibrated prior to the experiment, with its standard 10-point calibration procedure. Participants were also recalibrated in-between experimental blocks.

At a typical viewing distance of about 55 cm (head restraint was not used, since the Tobii® system does not require it) this corresponds to an angle of view of between 2 and 3.3 degrees. This compares with a rated accuracy of 0.5 degrees for the Tobii® system, so a fixation

on the face should be securely recorded as such. The eye-tracker works at 50Hz, so returning a location every 20ms.

ROIs were hand drawn based upon Gustella, Mithcells and Dadds (2008). All features were defined as separate non-overlapping ROIs. After features were defined a final ROI was made to encompass non-featural image space. We defined a fixation within one of the face regions as being three or more consecutive hits, i.e. 60ms minimum. If the eyes left the region, but returned within 60ms, it was considered to be the same fixation. Thus if the eyes moved away for three or more tracking samples, it was regarded as a new fixation elsewhere, but one or two missed samples were regarded as noise.

Procedure

All participants were tested individually. Participants were informed that they would be shown the faces of several actors and their task was to remember action committed by each actor, while having their eye movements recorded at the same time.

Participants completed a recognition memory task to measure perceptual dehumanization. In two blocks, faces were displayed intact, and in two blocks faces were offset. In each block, participants completed a learning phase and then a testing phase. In the learning phase, participants learned 8 face-action pairings. During the learning phase, actions appeared on scree prior to the face for 8 seconds. Following the action, the face appeared on screen for 12 seconds. The task and task timing is illustrated in Figure 3.1.

During the test phase, all 8 faces from the learning phase of the block were displayed in a single arrangement that remained on screen. Actions appeared serially below the face array, and the participant identified the face originally linked to the action in learning phase from the array.

Display order in both the test and recall phase and face-action pairings were fully randomized. Actions systematically varied in content. All that varied was the use of the word intentional versus accidental in descriptions of the act. Which actions were associated with intentional and unintentional harms was counterbalanced across participants. For example, when

an action appeared as an intentional harm “Dylan intentionally shot his brother while hunting” while when the action appeared as an unintentional harm it would read, “Dylan unintentionally shot his brother while hunting.”

Using a counterbalanced design, actions and faces were presented in two random orders. For each face-action pairing, half of participants viewed the intentional form of the action and half of participants viewed the unintentional form of each action. Order of action presentation was randomized during the testing phase of each action. Due to a programing error, responses in the memory task were not recorded. All participants were included in the data analysis.

Results

Number of Fixations. We conducted a 2 (orientation: intact, offset) X 2(intention: intentional, unintentional) repeated measure analysis of variance (ANOVA) using the average number of fixations for each of the 4 act-face combinations.

There was no significant difference in the frequency of fixations for intact (*M*=6.51, *SD*=.30) and offset (*M*= 6.21, SD=.30) faces $F(1,62)=2.21$, $p=.142$. Participants had a higher rate of fixation when the faces belongs to the actor responsible for intentional harm (*M*=8.35, *SD*=.34) than on the faces of actors responsible for unintentional harm (*M*= 4.38, *SD*=.26), $F(1,62)=331.8$, $p<.001$, $\eta_p^2=.843$

Consistent with the perceptual dehumanization hypothesis, the interaction between alignment and intention also emerged, $F(2,62)=160.21$, $p<.001$, $\eta_p^2= .721$. Participants fixated significantly more frequently when intact faces were paired with intentional actions (*M*=11.05, *SD*=.55) than with unintentional actions (*M*=2.58, *SD*=.16), $t(63) = 16.17$, $p <.001$, *d'*=20.91. Conversely, participants fixated significantly less frequently when offset faces were paired with intentional actions (*M*=5.65, *SD*=.21) than unintentional actions (*M*=6.78, *SD*=.44), $t(63) = 3.05$, $p =.002$, *d'*=3.28. This suggests that when faces could evoke holistic processing participants modify their pattern of fixation for the faces of norm violators.

Distance from center. We conducted a 2 (orientation: intact, offset) X 2(intention: intentional, unintentional) repeated measure analysis of variance (ANOVA) using the average from the vertical center for each of the 4 act-face combinations.

There was no significant difference in the dispersion of fixations for intact (*M*=32, *SD*=5.5) and offset (*M*= 42, *SD*=7.4) faces $F(1,62)=2.42$, $p=.125$. Participants showed significantly more disperse fixations for the faces of actors responsible for intentional harm (*M*=46, *SD*=6.7) than on the faces of actors responsible for unintentional harm (M= 28, SD=5.8), $F(1,62)=10.86$, $P=.001$, $\eta_p^2=.149$

Consistent with the perceptual dehumanization hypothesis, an interaction between alignment and intention also emerged, $F(2,62)=5.66$, $p=.02$, $\eta_p^2= .084$. Participants showed significantly more dispersion in their fixations when intact faces were paired with intentional actions (*M*=55, *SD*=7.4) than with unintentional actions (*M*=28, *SD*=5.1), $t(63) = 4.05$, $p <.001$, *d'*=4.25. Dispersion did not differ when offset faces were paired with intentional actions (*M*=28, *SD*=8.5) or unintentional actions (*M*=36, *SD*=7.9), $t(63) = .67$, $p =.25$. Again, this suggests that when faces could evoke holistic processing participants modify their pattern of fixation for the faces of norm violators.

Location of fixation. As shown in Figure 3.2.Panel A, we manually drew ROI of the forehead, cheeks, eyes, lips, nose, chin, hairline and blank space on each of the face display. We then computed the average number of fixations in each ROI for each face. Figure 3.2 illustrates the fixation frequency for each ROI by condition.

Based on prior work, we were particularly interested in the frequency of fixations on the eyes. We conducted a 2 (orientation: intact, offset) X 2(intention: intentional, unintentional) repeated measure analysis of variance (ANOVA) using the percentage fixations on the eye region for each 4 act-face combinations.

There was no significant difference between the percentage of fixations on the eyes for intact (*M*=42%, *SD*=2%) and offset (*M*= 39%, *SD*=2%) faces, $F(1,62)=2.86$, $p=.096$. However, participants fixated significantly less on the eyes of actors responsible for intentional harm

(*M*=35%, *SD*=2%) than on the eyes of actors responsible for unintentional harm (*M*= 45%, *SD*=2%), $F(1,62)=18.93$, $p<.001$, $\eta_p^2=.234$.

Consistent with the perceptual dehumanization hypothesis, the interaction between alignment and intention also emerged, $F(2,62)= 16.85$, $p<.001$, $\eta_p^2= .214$. Participants fixated significantly less on the eyes when intact faces were paired with intentional actions (*M*=33%, *SD*=3%) than with unintentional actions (*M*=51%, *SD*=3%), $t(63) = 4.29$, $p <.001$, $d'=6.0$. However, participants did not fixated significantly less on the eyes when offset faces were paired with intentional actions (*M*=38%, *SD*=2%) or unintentional actions (*M*=39%, *SD*=2%), $t(63) = .67$, $p =.45$. This suggests that only when faces could evoke holistic processing did participants avoid fixating on the eye region of the face of norm violators.

Discussion of Study 1

The pattern of gaze in study 1 suggests that when the faces of perpetrators of intentional harm had the capacity to evoke holistic processing, participants modified their pattern of visual attention. The intact faces of perpetrators were associated with a greater number of fixations over a greater region of the face. This pattern of visual attention is more consistent with featural processing than holistic processing (Eisen, 2007).

Furthermore, it seems participants are avoiding the eye region of the face. Many face-perception studies have shown that the eyes are critical in perceiving upright faces. The eyes are highly diagnostic for identity and expression judgments (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), and essential for monitoring ongoing social communications(Klin, Jones, Schultz, Volkmar, & Cohen, 2002). Therefore, avoiding “eye-contact” may a useful strategy for social disengagement.

Study 2

Study 1 demonstrates that participants attend to the faces of intentionally harmful actors differently than they typically attend to the faces of unintentionally harmful actors. In Study 2, we link changes in visual attention to changes in face processing.

Exogenous orienting is a reflexive saccade or an automatic response to a sudden change. In Study 2, we used this reflex to exogenously manipulated attentional focus and force individuals to focus on a face randomly assigned to belong to intentionally or unintentionally harmful actors, using a gaze pattern associated with the perpetrator of an *unintentional* harm. We predict this gaze pattern will produce holisitic process regardless of the socially information with which the face is paired.

Participants

Participants were 48 (28 Male and 20 Female) students at a northeastern university who participated in partial fulfillment of a course requirement. Data was collected over a two-week period. Sample size was determined by the number of students who volunteered to participate in the 12 days between the study posting and the end of the term. The average age of participation was 20.4 (stdev .9) and liberal (mean 5.2 on a 7 point scale).

Stimuli

Stimuli were thirty-two white male face stimuli from the Chicago Face Database (Ma, Correll, Witenbrink, 2015). Images were made into a graphic interchange formatted image (GIF), in which the appearance of multiple fixation-crosses manipulated visual fixation.

Method

We used a recognition memory task to measure perceptual dehumanization. For every participant, the experiment consisted of four blocks, each consisting of eight face–action associations. In two blocks, faces appeared intact during both the study and test phases; in two blocks, the faces appeared as offset during both the study and test phases. To control for difficulty or learning effects, the order of blocks was randomized across participants. Faces and actions were randomly assigned to one of four blocks. Within each block, we randomized the

face–action pairings across participants to avoid spurious performance effects for particular face–action combination.

Importantly, we manipulated the participants' visual fixation. Half of participants observed unaltered faces, which allowed them to fixate freely. Half of participants viewed faces where exogenous cues force them to visually fixate on the face as though it belonged to the perpetrator of an *unintentional* harm. For each face, we computed average pattern of fixation for that particular face, in Study 1 when it was assigned to belong to the perpetrator of an unintentional harm.

We computed the "average gaze pattern" by calculating the average duration of each fixation (until the sum of durations was greater than 8 seconds) for that face when it was associated with an unintentional harm in study 1. For each fixation, we then computed the average deviation in gaze from the center of the face as an absolute vector. We then used the most common direction of deviation to determine the direction of the vector. We therefore had an average time of onset and average location for each fixation for each face of an unintentionally harmful actor in study 1. An example of the calculated fixation locations is shown in Panel A of Figure 3.3.

In order to force participants to adapt this pattern of this pattern of gaze used by participants in Study 1, a fixation cross flashed on screen for 100ms in the "average" locations at the average time of onset associated with each fixation. To avoid uncued saccades, if the fixation length was greater than 2 seconds, the fixation-cross flashed in place every 2 seconds.

Each block consisted of a study phase and a test phase. In the study phase, participants learned eight face-action pairings. Participants viewed an action on screen for 5 seconds before the presentation of the face of actor (either intact or offset) for 8 seconds. During the test phase, participants viewed actions in a random order below an array consisting of all eight faces. Participants were asked to identify the correct face from the array by indicating the number associated with face. Face arrays were created by randomly assigning each of the eight faces a number.

Actions appeared serially below the face array, and the participant identified the face originally linked to the action in learning phase from the array. The task used the same intentional and unintentional actions as Study 1.

After completing the memory task, participants were asked their gender, age and political beliefs. We report all measures and conditions here.

Results

All participants were included in the data analysis. We conducted a 2 (alignment: intact, offset) X 2(intention: intentional, unintentional) X 2(fixation: controlled, uncontrolled) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 4 act-face combinations. As illustrated in Figure 3.4 Panel A, results replicated the alignment effect --participants were more accurate at identifying faces-pairings, when pairing used intact (*M*=.594, *SD*=.026) than offset (*M*=.465, *SD*=.027)faces $F(1,112)=22.98$, $p<.001$, $\eta_p^2 = .169$.

Consistent with the perceptual dehumanization hypothesis, an interaction between alignment and intention emerged, $F(2,112)=14.51$, $p<.001$, $\eta_p^2= .114$. Participants were marginally more accurate at identifying offset faces paired with intentional actions (*M*=.51, *SD*=.03) than offset faces paired with unintentional actions (*M*=.43, *SD*=.03), $t(114) = 2.70$, $p =.003$, *d'*= 2.69. Conversely participants more were more accurate at identifying intact faces paired with unintentional actions (*M*=.63, *SD*=.03) than intact faces paired with intentional actions (*M*=.55, SD=.03), $t(92) = 2.78$, $p =.003$, *d'*= 2.67. Therefore, there was clear reduction in the alignment effect for faces linked to intentional harms.

Consistent with the notion that face typical processing is associated with a particular pattern of gaze, an interaction emerged between alignment and fixation, $F(2,90)=6.61$, $p=.011$, $\eta_p^2= .055$. Participants were more accurate at identifying intact (*M*=.56, *SD*=.04) than offset faces (*M*=.37, *SD*=.04) when fixation was controlled, $t(50) = 5.24$, $p <.001$, *d'*= 6.34. However, participants were only marginally more accurate at identifying intact faces (*M*=.63, *SD*=.03) than offset faces(*M*=.57, *SD*=.04) when allowed to fixate freely, $t(63) = 1.79$, $p =.04$, *d'*= 2.00.

Finally, consistent with predications, a significant interaction emerged between alignment, fixation and the intention of the action, $F(3,112)=8.31$, $p=.005$, $\eta_p^2= .068$. When actions were intentional, manipulating fixation interfered with processing. When participants were forced to fixate on the faces of intentional perpetrators of harm as though they belonged to unintentionally harmful actors, participants were more accurate at identifying intact ($M=.56$, $SD=.04$) than offset faces ($M=.38$, $SD=.04$), $t(50) = 3.21$, $p <.001$, $d'= 6.00$. However, when participants were allowed to fixate freely, participants were more accurate at identifying offset faces ($M=.62$, $SD=.04$) than intact faces($M=.54$, $SD=.04$), $t(63) = 1.70$, $p =.05$, $d'= 2.67$ for intentional perpetrators of harm.

On the other hand, when actions were unintentional, fixation did not have an effect on processing. Participants were significantly more accurate at identifying intact ($M=.56$, $SD=.03$) than offset faces ($M=.39$, $SD=.02$) when fixation did not interfere with processing, $t(50) = 3.73$, $p <.001$, $d'= 5.67$. Participants remained more accurate at identifying intact faces ($M=.71$, $SD=.03$) than offset faces($M=.51$, $SD=.03$) when fixation interfered with processing, $t(63) = 3.8$, $p <.001$, $d'= 6.67$.

Discussion of Study 2

Results of Study 2 suggest that patterns of visual fixation may drive perceptual dehumanization. When exogenous cuing lead participants to fixate on the face of an intentionally harmful actor in a manner typically used to fixation on unintentionally harmful actor, participants no longer show a reduction in face-typical processing for the faces of intentionally harmful actors. This suggests that the atypical patterns of fixation observed in Study 1 likely drive perceptual dehumanization effects.

Study 3

Study 2 demonstrates that forcing participants to fixate on the faces as intentionally harmful actors, in a manner typically used when observing unintentionally harmful actors, removes the effects of perceptual dehumanization. However, if fixation is driving the attenuation

in face processing, the opposite effect should occur as well. Study 3 tests if forcing to fixate on the faces of unintentionally harmful actors in manners typically used to observe perpetrators of intentional harm, leads to an attenuation of face-specific processing in faces typically processed holistically.

Participants

Participants were 92 (60 Male and 32 Female) participants from Amazon Mechanical Turk Masters. The average age of participation was 35.0 (*SD*=10.8) and liberal (*M*=4.5 on a 7 point scale).

Stimuli

Stimuli were thirty two white male face stimuli and eighteen black male face stimuli from the Chicago Face Database (Ma, Correll, Witenbrink, 2015). Images were made into GIFs, in which the appearance of multiple fixation-crosses manipulated visual fixation.

Method

We used a recognition memory task to measure perceptual dehumanization. For every participant, the experiment consisted of four blocks, each consisting of eight face–action associations. In two blocks, faces appeared intact during both the study and test phases; in two blocks, the faces appeared as offset during both the study and test phases. To control for difficulty or learning effects, we randomized the order of blocks across participants. We randomly assigned faces and actions to one of four blocks. Within each block, we randomized the face–action pairings across participants to avoid spurious performance effects for particular face–action combination.

Importantly, we manipulated the participants visual fixation. Half of participants observed unaltered faces with no visual fixation. Half of participants viewed gifs of faces, which used variable fixations to force them to visually fixate on the face in a manner typical of intentionally harmful actors in Study 1. For each face, we computed average pattern of fixation for that particular face, in Study 1 when it was assigned to belong to the perpetrator of an **intentional** harm.

We computed the "average gaze pattern" by calculating the average duration of each fixation (until the sum of durations was greater than 8 seconds) for that face when it was associated with an intentional harm in study 1. For each fixation, we then computed the average deviation in gaze from the center of the face as an absolute vector. We then used the most common direction of deviation to determine the direction of the vector. We therefore had an average time of onset and average location for each fixation for each face of an intentionally harmful actor in study 1. An example of the calculated fixation locations is shown in Panel B of Figure 3.3.

In order to force participants to adapt this pattern of this pattern of gaze used by participants in Study 1, a fixation-cross flashed on screen for 100ms in the "average" locations at the average time of onset associated with each fixation. To avoid uncued saccades, if the fixation length was greater than 2 seconds, the fixation-cross flashed in place every 2 seconds.

Each block consisted of a study phase and a test phase. In the study phase, participants learned eight face-action pairings. Participants viewed an action on screen for 5 seconds before the presentation of the face of actor (either intact or offset) for 8 seconds. During the test phase, actions were shown in a random order below an array consisting of all eight faces. Participants were asked to identify the correct face from the array by indicating the number associated with face. Face arrays were created by randomly assigning each of the eight faces a number.

After completing the memory task, participants were asked their gender, age and political beliefs. We report all measures and conditions here.

Results

All participants were included in the data analysis. We conducted a 2 (alignment: intact, offset) X 2(intention: intentional, unintentional)X 2(fixation: controlled, uncontrolled) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 4 act-face combinations. As illustrated in Figure 3.4 Panel B, Participants were more accurate at identifying faces-pairings, when pairing used intact (*M*=.62, *SD*=.33) than offset (*M*=.56, *SD*=.32)faces $F(1,90)=6.12$, $p=.015$, $\eta_p^2= .064$.

Consistent with the perceptual dehumanization hypothesis, an interaction between alignment and intention emerged, $F(2,90)=7.70$, $p=.007$, $\eta_p^2= .08$. Participants were marginally more accurate at identifying offset faces paired with intentional actions ($M=.58$, $SD=.03$) than offset faces paired with unintentional actions ($M=.55$, SD=.03), $t(92) = .40$, $p = .35$. Conversely participants more were more accurate at identifying intact faces paired with unintentional actions ($M=.66$, $SD=.03$) than intact faces paired with intentional actions ($M=.59$, $SD=.03$), $t(92) = 2.74$, $p = .003$, $d' = 2.33$. Therefore, there was clear reduction in the inversion effect for faces linked to negative actions.

Consistent with the notion that face typical processing is associated with a particular pattern of gaze, an interaction emerged between alignment and fixation, $F(2,90)=17.52$, $p<.001$, $\eta_p^2= .16$. Participants were more accurate at identifying intact ($M=.63$, $SD=.03$) than offset faces ($M=.49$, $SD=.02$) when fixation did not interfere with processing, $t(46) = 1.90$, $p = .03$, $d' = 4.67$. Conversely, participants were more accurate at identifying offset faces ($M=.64$, $SD=.03$) than intact faces($M=.60$, $SD=.03$) when fixation interfered with processing, $t(46) = 1.89$, $p = .03$, $d' = 1.33$.

Finally, consistent with predications, a significant interaction emerged between alignment, fixation and the intention of the action, $F(3,90)=9.86$, $p=.002$, $\eta_p^2 = .10$. When actions were unintentional, manipulating fixation interfered with processing. Participants were more accurate at identifying intact ($M=.63$, $SD=.03$) than offset faces ($M=.49$, $SD=.02$) when fixation did not interfere with processing, $t(46) = 2.35$, $p = .01$, $d' = 4.67$. Conversely, participants were more accurate at identifying offset faces ($M=.64$, SD=.03) than intact faces($M=.60$, $SD=.03$) when fixation interfered with processing, $t(46) = 1.77$, $p = .03$, $d' = 1.33$. Therefore, there was clear reduction in the inversion effect for faces linked to negative actions.

On the other hand, when actions were intentional, fixation did not have an effect on processing. Participants were not significantly more accurate at identifying intact ($M=.60$, $SD=.03$) than offset faces ($M=.55$, $SD=.02$) when fixation did not interfere with processing, $t(46)$

= .56, *p* =.16. Participants were no more accurate at identifying offset faces (*M*=.57, *SD*=.03) than intact faces(*M*=.63, *SD*=.03) when fixation interfered with processing, *t*(46) = .35, *p* =.40.

Discussion of Study 3

The results of Study 3 suggest that patterns of visual fixation may drive perceptual dehumanization effects. When fixation was controlled, and participants used the fixation patterns adopted towards intentionally harmful actors in study 1, participants showed an attenuation of face typical processing for both intentionally harmful actors and unintentionally harmful actors. This suggests, fixation patterns in Study 1 changed the way participants were processing the faces of harmful actors. As clearly illustred in Figure 3.4 the manipulations in Studies 2 and 3 produced the opposite effect on perception. While the fixation pattern used in Study 2, increased holistic processing, the fixation pattern used in Study 2 removed holistic processing. Therefore, the results of study 2 and 3 in conjunction rule out a number of simple alternative explanations (e.g. the exogenous cue distracts participants).

Study 4

Studies 2 and 3 demonstrate that manipulating visual attention drive the changes in visual processing associated with norm violators. Study 4 examines if changes in fixation can attenuate the Other Race Effect.

Participants

Participants were 215 (90 Male and 125 Female) Caucasian participants from the Wharton Behavior lab. 258 Participants were recruited, non-white participants were omitted. The average age of participation was 21.6 (*SD*=10.7) and liberal (*M*= 4.5 on a 7 point scale). It should be noted that the Study used a student sample to examine race. The student sample was drawn from a privileged, predominately white university. While, this is not uncommon in psychological research an atypically of the sample is that the university is located in a predominately African-American, relatively disadvantaged area of a city. As a consequence, race appears highly (and visibly) related to economic (e.g. poverty) and social problems (e.g. shootings, teenage

pregnancy) in student's immediate environment and corresponds highly with social groupings (university students vs west Philadelphians). To the degree that racial attitudes are based in Bayesian computations these environmental factors may alter race effects in our study.

Method

Stimuli. Stimuli were eighteen white male face stimuli and eighteen black male face stimuli from the Chicago Face Database (Ma, Correll, Witenbrink, 2015). Images were made into GIFs, in which the appearance of multiple fixation-crosses manipulated visual fixation.

Procedure. We used a recognition memory task to measure perceptual dehumanization. Participants were asked to remember face name pairings for African-American and Caucasian faces.

Importantly, we manipulated visual fixation across participants. Participants were randomly assigned to one of three conditions. Participants fixated: free, featurally or centrally. In the free fixation condition participants viewed unaltered faces. Participants attention was not manipulated and participants could fixate freely. In the feautral fixation condition participants viewed faces which were manipulated in order to force them to visually fixate on multiple features of the face. In these faces, a flashing-cross appears on different facial features. The cross appeared on the nose, the mouth, the chin, the forehead and the eyes in a randomly determined order. The fixation-cross appeared every 1900 milliseconds for 100 milliseconds for the entire display of the face.

In the central fixation condition, participants viewed faces, which were manipulated in order to force them to visually fixate on the center of the face. In these faces, the faces displayed had a flashing-cross centered in the vertical and horizontal mid point of the eye region. The fixation-cross appeared every 1000 milliseconds for 200 milliseconds for the entire display of the face.

The experiment used a fully crossed design. For every participant, the experiment consisted of four blocks, each consisting of six face–name associations. In two blocks, faces appeared upright during both the study and test phases; in two blocks, the faces appeared as

inverted during both the study and test phases. Faces and names were randomly assigned to one of four blocks. African-American and Caucasian faces were interleaved within each block. Within each block, we randomized the face–action pairings across participants to avoid spurious performance effects for particular face–action combination. To control for difficulty or learning effects, we randomized the order of blocks across participants.

Each block consisted of a study phase and a test phase. In the study phase, participants learned six face-name pairings. Participants viewed a single face (either upright or inverted) and the actors name on a screen for 10 seconds. We randomly selected names for Caucasian faces from the 50 most common Male Caucasian names in 1991 (the average age of the photo target). We randomly selected names for African-American faces form 50 most common Male African-American names in 1991 (the average age of the photo target).

During the test phase, participants viewed actions in a random order below an array consisting of all six faces. Participants were asked to identify the correct face from the array by indicating the number associated with face. Face arrays were created by randomly assigning each of the six faces a number. After completing the memory task, participants were asked their gender, age and political beliefs. We report all measures and conditions here.

Results

All participants were included in the data analysis. We conducted a 2 (orientation: upright, inverted) X 2(race: white, black)X 2(fixation: free, central, featural) repeated measure analysis of variance (ANOVA) using the average response accuracy for each of the 4 act-face combinations.

Results replicated the face inversion effect --participants were more accurate at identifying faces-pairings, when pairing used upright (*M*=.62, *SD*=.03) than inverted (*M*=.56, *SD*=.02)faces $F(1,212)=68.48$, $p<.001$, $\eta_p^2 = .244$. Similarly consistent with past results, participants were more accurate at identifying same-race faces (Caucasian) (*M*=.61, *SD*=.03) than other race faces (African-American) (*M*=.57, *SD*=.03), $F(1,212)=65.7$, $p<.001$, $\eta_p^2= .237$.

The interaction between orientation and race was marginal, *F*(2,212)=2.60, *P*=.10, η_p^2= .012. This reduction in the Other Race Effect, was due to visual attenuation. A three way interaction between race, orientation and visual fixation emerged, *F*(2,90)=17.52, *p*<.001, η_p^2= .16.

Participants were more accurate at identifying upright (*M*=.63, *SD*=.03) than inverted faces (*M*=.49, *SD*=.02) when fixation did not interfere with processing, *t*(46) = 1.90, *p* =.03, *d'*= 5.49. Conversely, participants were more accurate at identifying inverted faces (*M*=.64, *SD*=.03) than upright faces(*M*=.60, *SD*=.03) when fixation interfered with processing, *t*(46) = 1.89, *p* =.03, *d'*= 1.33. Therefore, there was clear reduction in the inversion effect for faces linked to negative actions.

Finally, consistent with predications, a significant interaction emerged between orientation, fixation and the intention of the action, *F*(3,90)=7.23, *p*=.001, η_p^2 = .064.

When fixation was not manipulated, results replicated past work on the other race effect. Participants were more accurate at identifying faces-pairings, when pairing used upright (*M*=.48, *SD*=.03) than inverted (*M*=.36, *SD*=.02)faces *F*(1,69)=26.75, *p*<.001, η_p^2= .279. Similarly consistent with past results, participants were more accurate at identifying same-race faces (Caucasian) (*M*=.48, *SD*=.03) than other race faces (African-American) (*M*=.36, *SD*=.03), *F*(1,69)=24.32, *p*<.001, η_p^2= .261. Importantly, a significant interaction between orientation and emerged, *F*(2, 69)=20.17, *p*<.001, η_p^2= . 226. Participants were more accurate at identifying upright (*M*=.58, *SD*=.03) than inverted faces (*M*=.36, *SD*=.02) for Caucasian faces, *t*(46) = 6.45, *p* <.001, *d'*= 7.33. However, participants were not significantly more accurate at upright (*M*=.39, *SD*=.04) than inverted faces(*M*=.36, *SD*=.04) when the faces belonged to African-American targets, *t*(46) = 0.289, *p* =.386. Therefore, there was clear reduction in the inversion effect for African-American actors.

When fixation was manipulated such that participants fixated centrally, the Other Race effect was attenuated. Participants were more accurate at identifying faces-pairings, when pairing used upright (*M*=.51, *SD*=.03) than inverted (*M*=.40, *SD*=.02)faces *F*(1,71)=33.73, *p*<.001,

η_p^2= .322. Similarly consistent with past results suggesting heighted attention to same-raced faces, participants were more accurate at identifying same-race faces (Caucasian) (*M*=.52, *SD*=.03) than other race faces (African-American) (*M*=.42, *SD*=.03), *F*(1,71)=19.48, *p*<.001, η_p^2= .215. However, when participants fixation was manipulated, so that it was the same across conditions, the interaction between race and inversion was attenuated, *F*(2, 71)=.036, *p*=.85. Both Caucasian and African American faces showed the facial inversion effect. Participants were more accurate at identifying upright (*M*=.60, *SD*=.03) than inverted faces (*M*=.45, *SD*=.02) Caucasian faces, *t*(70) = 3.38, *p* <.001, *d'*= 5.89. Similarly, participants were more accurate at upright (*M*=.47, *SD*=.04) than inverted faces(*M*=.34, *SD*=.04) when the African-American targets, *t*(70) = 3.85, *p* <.001, *d'*= 3.25.

As when fixation was manipulated such that participants fixated centrally, when fixation was manipulated through featural processing, the Other Race effect was attenuated. Consistent with past results suggesting heighted attention to same-raced faces, participants were more accurate at identifying same-race faces (Caucasian) (*M*=.52, *SD*=.03) than other race faces (African-American) (*M*=.42, *SD*=.03), *F*(1,72)=23.64, *p*<.001, η_p^2 = .247. In spite, of the processing manipulation, participants were more accurate at identifying faces-pairings, when pairing used upright (*M*=.51, *SD*=.03) than inverted (*M*=.40, *SD*=.02)faces F(1,72)=11.37, *p*<.001, η_p^2 = .136. Again, when participants fixation was manipulated, the interaction between race and inversion was attenuated, *F*(2, 71)=1.169, *p*=.283.

Study 4 Discussion

The results of Study 4 suggest that patterns of visual fixation may underlie the Other Race effect (at least in certain context). When participants attend to faces freely, the results replicated the other race effect. When exogenous orienting forced participants to attend centrally, participants showed face typical processing for both Caucasians and African-Americans. However, when orienting lead participants to attend to features of the face, participants showed an attenuation of face typical processing for both Caucasians and African-Americans.

Although, it is not surprising that featural fixations lead to an attenuate of holistic processing, it is notable that central fixations could produce the holistic processing of other race faces. If the other race effect is due to a failure to encode other race faces as faces, manipulations of attention should not induce holistic processing. This result suggests that social features of other races underlie the effect.

When interpreting our results, the location of student sample is worth noting. Participants in our sample have a high degree of exposure to African-American faces, the population of West Philadelphia is 76% African American (interestingly, the majority of Caucasians are affiliated with the University). Therefore although our pattern of results was inconsistent the ORE resulting from a lack of expertise, the ORE may be due to expertise under some conditions.

Study 5

Results from Studies 1 to 4 suggest that social information leads to changes in visual fixation, which alters the visual processing of faces. Study 5 directly links visual fixation to a change in the social behavior adapted towards these targets.

Specifically, Study 5 tests the impact of the manipulations of visual fixation on punitive decisions.

Participants

Participants were 144 (84 Male and 60 Female) Caucasian American Masters workers on Mechanical Turk who participated for $1.00 payment. We collected data from 200 participants, however, non-Caucasian participants were excluded from analysis.

Stimuli. Stimuli were ten white male face stimuli and ten black male face stimuli from the Chicago Face Database (Ma, Correll, Witenbrink, 2015). Images were made into a graphic interchange formatted image (GIF), in which the appearance of multiple fixation cross manipulated visual fixation.

Procedure. Participants rated the appropriate punishment for 20 individuals (10 white faces, 10 black faces) on a unique 13-point scale adopted from the justice-research literature(Carlsmith, Darley, & Robinson, 2002; John M Darley, Carlsmith, & Robinson, 2001).

The scale ranged from “No sentence” to “Death sentence” with non-linear intervals given in weeks, months, and years of incarceration. Actions were randomly assigned to faces for each participant.

Participants were randomly assigned to one of three conditions. Participant’s visual fixation, while viewing the faces was manipulated. Participants could fixate: free, centrally or featurally. The stimulus properties were identical to those in Study 4.

Results. We conducted a 2 (Race: Caucasian, African-American) X (Fixation: free, central, featural) mixed model ANOVA on punitiveness. As shown in Figure 3.5, there was a significant effect of race on punitiveness, consistent with past research participants assigned significantly harsher punishments to African-American (*M*=8.2, *SD*=1.3) than Caucasian (*M*=7.8, *SD*=1.2) faces, $F(1,133)=4.29$, $p=.044$, $\eta_p^2 = .03$.

In line with our predictions, visual fixation significantly influenced punitive drives, $F(1,133)=14.27$, $p<.001$, $\eta_p^2 = .177$. Participants were significantly more punitive when fixating featurally (*M*=8.9, *SD*=1.3) than when allowed to fixate freely(*M*=8.3, *SD*=1.4) , $t(46) = 3.22$, $p =.002$, *d’*= .44. On the other hand participants were significantly less punitive when fixating centrally(*M*=7.9, *SD*=1.4) than when allowed to fixate freely(*M*=8.3, *SD*=1.4) , $t(45) = 5.10$, $p <.001$, *d’*= .29.

Finally, manipulating visual fixation, altered punitive behavior differently for individuals of different races. There was a significant interaction between race and visual fixation, $F(3,133)=4.18$, $p=.02$, $\eta_p^2 = .059$. When participants fixated freely, they were significantly more punitive than African-Americans (M=8.8, SD=1.1) than Caucasians(*M*=8.0, *SD*=1.1) , $t(50) = 3.6$, $p <.001$, *d’*= .73. When participants fixated centrally, they were not significantly more punitive than African-Americans (*M*=7.9, *SD*=1.1) than Caucasians(*M*=7.8, *SD*=1.2) , $t(45) = .22$, $p=.82$. Similarly, when participants fixated centrally, they were not significantly more punitive than African-Americans (*M*=8.9, *SD*=1.1) than Caucasians(*M*=8.8, *SD*=1.1) , $t(51) = .14$, $p=.88$.

Discussion of Study 5

Study 5 directly links patterns of visual fixation to willingness to punish. In line with our predictions, when exogenous cuing leads participants to fixate centrally, they become less punitive. When exogenous cuing leads participants to fixate featurally, they become more punitive.

Interestingly, there was an interaction of race with visual fixation. Although when visual fixation was controlled, individuals punished African-American and Caucasian actors equally, when participants fixated freely, individuals punished African American actors significantly more harshly than Caucasian actors (for identical actions). Importantly, this result suggests that minor behavioral changes such as increased eye contact can control at least part of the punitive differential observed in society.

General Discussion

Work on both the Other Race Effect and Perceptual Dehumanization documents the attenuation of face specific processing, however, neither line of work captures the mechanism that enables the selective engagement of face processing. The present work suggests that social processes shape perceptual processes through attention.

Study 1 uses eye tracking to examine changes in visual attention and suggests that directing attention away from the center of the face, specifically the eyes, attenuates face specific processing. Studies 2 and 3 suggest that when fixation was controlled, perceptual dehumanization (the attenuation of punatively face-specific) is attenuated. This pattern of results, suggests that the atypical patterns of fixation observed in Study 1 are likely driving perceptual dehumanization effects.

It is worth noting that in our dataset, it appears that visual fixation may drive the Other Race effect as well. Controlled central fixation on other race faces was able to induce the holistic processing of these faces. Neither perceptual narrowing nor expertise can account would predict that manipulating fixation could induce the holistic processing. This result suggests that visual attention and the social features of other races may underlie the well-established effect. Study 5

suggests that it is the changes in visual fixation, which enable perceptual processes to effect social behavior.

The eye-tracking results were extremely robust. Indeed, the highly deviated gaze would be overtly visible in a social interaction, as would the notable reduction in eye contact. It is important to realize that while this type of interaction would likely be acceptable when engaging with criminals in most social groups (barring Quakers, Norwegians and restorative justice advocates), these dynamics would not apply to race relations in many parts of the world, foremost among which are educated Northeast liberal Americans (the demographic from which our sample is drawn). To the degree that attentional mechanisms underlie the other race effect, given the complex social dynamics surrounding race relations, one would predict attention would be misdirected covertly. Consequently, one would likely need to develop clever paradigms for assessing covert attention to test if different attentional strategies underlie the ORE.

Stated in its simplest form, these results suggest that people avoid eye contact with individuals whom they perceptually dehumanize. This simplified form of the argument relates to the contact hypothesis (Allport, 1954). Allport's theory states that under appropriate conditions interpersonal contact is one of the most effective ways to reduce prejudice between majority and minority group members. Allport's proposal was that properly managed contact between the groups should reduce these problems and lead to better interactions. In line with Allport's suggestion, our work suggests that changes in visual attention, leads to changes the perceptual categorization and subsequent treatment of "others." This line of work enriches this central social psychological theory through providing a detailed mechanistic account of the processes which make eye contact an effective vehicle of humanization. It connections across levels of analyses, between the more macro social phenomena and the micro mechanisms of face perception through bridging neuro-cognitive work on facial and object perception with social psychological work on contact and stigmatization.

There is an interesting question of how aware individuals are of the perceptual changes. The choice of where to send the eye next is not random but instead appears to be guided

(Rayner & Pollatsek, 1989). Yarbus (1967), for example, pointed out that the pattern of eye fixations that a given observer produces is influenced by properties of the scene as well as the goals and interests of the perceiver. This suggests that atypical processing occurs with some awareness; however, changes in perceptual processing likely function outside the conscious domain. Perceptual dehumanization therefore raises interesting questions about control and automaticity.

Research on priming and automaticity in social psychology suggests that the mere, passive perception of environmental events directly triggers higher mental processes in the absence of any involvement by conscious, intentional processes (see reviews in Bargh & Ferguson, 2000; Dijksterhuis, Aarts, & Chartrand, 2007; Higgins, 1996). Our model of perceptual dehumanization provides an alterative route through which implicit processes can shape behavior. It suggests an ongoing interplay between conscious and unconscious processes. As suggested by table 3.1, high-order slower cognitive processes may have the ability to shape quicker more basic processes. This movement between higher order and basic processes (which occur more rapid than cognition) may result in an interesting blurring of conscious and unconscious processes.

While individuals may not be aware of the mechanisms through which they adopt harsher attitudes towards the targets of perceptual dehumanization, it appears to occur due to a strategic attentional deployment. Insofar as attention is controllable, unfair treatment due to perceptual dehumanization may be easy to attenuate. However, insofar as redirecting attention produces dissonance and discomfort, the changes may be difficult to reinstate without high degrees of self-awareness.

The interplay between these processes raises questions about cognitive organization. The current results suggest that higher-level processes may be captured through interactions among lower level system, rather than mandating unique architecture. More specifically, “central”

and flexible systems (e.g. attention) may control the expression of lower level processes (e.g. perception) so that they act to create a system that serves social goals.

This organizational structure is somewhat incongruous with classical notions of modularity. Definitionally, modules (particularly as the term is used within perception) will have specific input criteria and only information of certain types or formats will be processable by a specialized system. As a result, the modularity arguments are largely theoretically uninformative. The attentional modulation of perceptual processes is clearly inconsistent with strictly modular perspective such as the one advocated by Sperber (1994) and to a lesser degree the unencapsulated cognitive mechanisms as Fodor (1983) suggested.

On the other hand, this structural organization is largely consistent with ideas put forth by Gestalt psychologist. The central principle of Gestalt psychology is that the mind forms a global whole with self-organizing tendencies. Gestalt principles stressed interactions among fields of psychological force; Just as the arrangement of electrostatic forces in an electrical field, the arrangement of psychological forces in the "life space" determines behavior, perception and other psychological processes.

Gestalt psychology provides the theoretical foundation for much of social psychology. For example, Heider relied heavily upon the principles of structure and organization in his work on attribution theory (Heider, 1958). Lewin's model of group processes viewed group members' interactions in terms of fields of force (Lewin, 1947a, 1947b). Perhaps most directly, Asch theorized that person perception acts in the same manner; we perceive other individuals as whole units (Asch, 1946, 1952). In spite of this centrality, Gestalt principles are largely absent from modern Social psychology.

In the present work, we combine the Gestalt theoretical perspective with modern work in attention and perception. As Asch demonstrated, prior knowledge can bias attention and alter the judgment of traits (therefore changing how a person is perceived). We suggest social-attentional

processes can bias attention in a literal regard as well. Solomon Asch famously claimed, “Most social acts have to be understood in their setting, and lose meaning if isolated. No error in thinking about social facts is more serious than the failure to see their place and function” (Asch, 1952/1987, p. 61). We extend this argument by suggesting that even perceptual processes need to be understood within their broader social context.

DISCUSSION

The results of eighteen studies support the hypothesis that the holistic processing of faces is attenuated by social facts in a manner that serve the formation of cooperative communities. In the first chapter we establish the phenomenon of *perceptual dehumanization* through demonstrating a functional linkage between face processing and social behavior. In the second chapter we determine the cognitive-motivational structure that perceptual dehumanization targets. In the third and final chapter we establish the cognitive mechanism through which perceptual dehumanization occurs.

Chapter 1 examines the theory of perceptual dehumanization in the context of norm violators. Using multiple manipulations of face processing we establish that people show a spontaneous reduction in holistic processing for the faces of norm violators and that engaging in holistic processing reduces the ability to punish. These studies establish functional specificity through documenting that attenuations in face processing are specific to culpable actors and establish real world validity through linking changes in face processing to real world punitive rituals.

In the second chapter we combine past theoretical accounts of dehumanization with modern work on perceptual categorization to propose that perceptual dehumanization occurs to produce indifference to harm (i.e. suppress helping behavior) as opposed to increasing the desire to actively or passively inflict harm. We do this through documenting that the perceptual dehumanization of civil servant in high-risk roles. Because these civil servants command respect and admiration (as confirmed by our own data and work by S. Fiske), the desire to harm them is not a potential explanation of perceptual dehumanization. Rather the effects appear to be driven by an increased willingness to sacrifice these individuals for the greater good of society.

Finally Chapter 3 examines the mechanism that underlines dehumanization. In this chapter, I build upon as Gestalt theoretical perspective, which suggests that top down processes

bias the interpretation of subsequent information, and argue that a shift in visual attention leads to changes in perceptual processing. Eye tracking results establish that social information leads to changes in gaze. Exogenous manipulations of gaze, which reproduce the gaze patterns associated "intentionally harmful actor" and "unintentionally harmful actor" suggest that changes in gaze lead to attenuations in face processing.

This work contributes to a growing body of work in social cognition, which has documented the attenuation of the holistic processing of faces under a variety of circumstances (Kelly, Quinn, Slater, Lee, Ge & Pascalis, 2007; Michel, Rossion, Han, Chung, & Caldara, 2006; MacLin & Malpass, 2001, 2003). It is our hope that applying a theoretical perspective can bring a measure of conceptual order to the growing empirical literature examining social perception.

Our work builds upon the argument that faces are intrinsically social. Face processing abilities evolved within an increasingly cooperative social structure. As the primary modality through which humans identify others, facial processing may be deeply important to the maintenance of these structures.

The current empirical work builds upon this argument by suggesting that human face processing is flexibly engaged in order to facilitate cooperation. In conjunction, our results suggest that social information produces changes in visual attenuation, which attenuate the holistic processing of faces in order to strategically inhibit helping behavior. We posit that perceptual dehumanization enables individuals to satisfy the conflicting demands imposed by the complexities of social interdependency: the need to get along and cooperate and the need to protect oneself and one's group from potential exploitation.

An important caveat to our work is the language we use to describe changes in face processing. We make the assumption that face processing is a default process for viewing faces. However, this assumption is based upon experiments in which same race faces are presented to participants one at a time, in an otherwise, visually devoid environment. Past research on social

information and face processing has indeed proposed the possibility that "face-specific" processing in not the default processing of human faces (Van Bavel, Packer & Cunningham, 2011).

Understanding the "default" process for viewing faces may inspire broader questions about human nature. From a functionalist perspective, the face processing default is determined by the default goals of human behavior. If humans' default is to behave in kind, caring and empathic ways, and an inhibition of empathy is required to elicit self interested behavior, we would predict the default is to process faces holistically. Alternatively, if the default life of man is solitary, nasty and brutish and empathy is required to overcome the natural tendency toward self-interested behavior, we would predict that the default is to process faces featurally. One interesting way to capture this tension may be through combining computation models of face processing and computational models of cooperation.

By adapting a middle range theoretical lens we are able to make concrete prediction (Merton, 1967; Denzin, 1970). For example, our theory predicts that individuals perceptually dehumanize others who it is costly to help, in order to reduce the cognitive cost of not helping. Similarly, it predicts the perceptual dehumanization of sexually promiscuous female actors because it is advantageous to our own reproductive strategy.

There are a number of additional avenues future work could explore. For example, a consistent theme throughout our results is that featural processing facilitates treating people as means to ends. This connects to numerous lines of work in social psychology. For example, past work suggests that factors such as power and wealth facilitate treating individuals as a means towards an end (Gruenfeld, Inesi, Magee & Galinsky, 2008; Piff, Stancato, Côté, Mendoza-Denton & Keltner, 2012). It would be interesting to test, if factors such as these are associated with changes in face processing.

Relatedly, it would be provocative to explore if individual differences, which correspond to differences in beliefs about how others should be treated (i.e. do they deserve respect or

autonomy or are they simply means to achieving one's own goals), affect face processing. This argument suggests that a high belief that others can be treated as a means to achieving one's goals, would correspond to *globally* low levels of holistic processing. Therefore traits such as Machiavellianism (Dahling, Whitaker & Levy, 2008) and psychopathy (Hare, 1999) should negatively predict the degree to which face stimuli elicit holistic processing.

Interestingly, perceptual dehumanization may interact with cultural practices in manners, which increase individuals' propensity to perceptually dehumanize certain groups. Some theorists suggest that people are innately predisposed to learn certain types of associations (Garcia, Kimeldorf, Koelling, 1955). Building upon this argument, others have argued that cultures acquire norms and practices in line with these innate predilections (Sperber, 2007). To this end, we would predict that cultural practices should produce body and face modification rituals, which perceptually dehumanize groups whom they are indifferent to harming.

Consistently, in Chapter 1 blindfolding increases perceptual dehumanization, facilitates punishment, and has emerged in multiple cultural contexts. Another potential example is war paint. War paint is associated with a perceptually dehumanized group (warriors), distorts holistic processing and is a practice that has emerged in several places and times. Yet another example is lipstick. Past work suggests that sexualized females are dehumanized (McKinon, 1983), lipstick is frequently used as a manipulation of feautral processing in work on perception, and lipstick is culturally associated with sexualized females.

These cultural effects may not be limited to faces. As with faces, human bodies elicit specialized processing. However, these effects are dependent upon the body being presented symmetrically (Tarr, 2012). Therefore one would predict that sexually objectifying postures tend to position the body asymmetrically. Similarly, sexually objectifying clothing may be more likely to have asymmetrical patterns, capture attention in manners which alter typical patterns of gaze (e.g. bight colors), or even induce asymmetrical postures (e.g. high heels).

Finally, one would predict that cartoons may strategically distort faces. For example, one would predict that cartoons, which anthropomorphize animals, would depict the animals in ways that increase holistic processing—symmetrical faces, large and bright eyes (in order to draw visual attention towards the center of the face), and unobtrusive features. Conversely, one would predict political cartoons, which strip actors of their humanity, depict actors in ways, which increase featural processing—small narrow eyes, large visually distracting features and asymmetry.

We believe that the attenuation of face-typical processing – perceptual dehumanization – is a basic form of social dehumanization. Dehumanization is defined "the denial of humanness" (e.g. Haslam, 2001). Perceptual dehumanization is the attenuation of perception processes typically evoked by humans. Therefore, based upon the popular definition, perceptual dehumanization is a form of dehumanization. Furthermore, perceptual dehumanization has been documented in most traditionally dehumanized groups. Therefore, although perceptual dehumanization is a less socially charged way of denying the features of personhood and occurs under a broader range of circumstances, it nonetheless denies one aspect of the typical response evoked by persons.

We realize that this assertion may be problematic as it is made on adductive inference and definitional grounds. Therefore, this claim should be substantiated through an empirical process that allows deductively derived conclusions. Because using typically dehumanized groups would rely upon adduction to demonstrate dehumanization, it is difficult to test this link. One possible way to test this more directly is to explicitly manipulate beliefs about the "humanness" of certain entities and demonstrate that beliefs about humanness directly influence holistic processing.

Although the "denial of humanness" is typically considered a negative process (in both the attributions association with the target of dehumanization and the implications about an observer who would view another person as less than human), we suggest that perceptual

dehumanization is a value-neutral process. Unlike linguistic markers of dehumanization, perceptual dehumanization does not imply negative attitudes. Rather, it suggests an indifference to the individual target's welfare.

As a consequence, observers' moral reactions to the perceptual dehumanization will hinge on their beliefs about the legitimacy of the resultant behavior. For instance, when utilitarian and deontological moral rules clash, as in in the trolley problem, utilitarians would likely view the perceptual dehumanization of the single individual as laudable and perceptual dehumanization of the group as questionable. On the other hand, deontological thinkers would likely support the opposite pattern of perceptual dehumanization. Similarly, most individuals would deem the perceptual dehumanization of a "rapist" as beneficial and the perceptual dehumanization of a "rape victim" as abhorrent, but of course there is enormous variance in the ways in which individuals define rape.

Another question raised by our results is the degree to which the attenuation of face processing is conscious. Although the direction of attention is arguably a fully conscious, intentional process (Koch & Tsuchiya, 2007), the consequences of a change in attention appear to function outside of individual's awareness. Insofar as attention is controllable, unfair treatment due to perceptual dehumanization may be easy to attenuate. To the degree that one believes perceptual dehumanization leads to ***unfair*** treatment, linking attention to perceptual dehumanization is potentially extremely useful because this link offers low effort automatic cognitive solutions to improving the treatment of dehumanized groups.

Notably, atypical engagement with faces is often considered rude and increases the risk of retaliatory actions such as lawsuits. So much so, that advising typical engagement (eye contact) appears to be endorsed in several situations where perceptual dehumanization may occur. For example, current medical teaching encourages future surgeons to maintain eye contact with their patients. Similarly, the HR practices of many companies suggest that eye contact is the key to good customer service (Batt, 2002).

That said, “humanizing” may not be optimal under many circumstances. Insofar as redirecting attention reduces dissonance and discomfort, removing this avenue of emotional self-protection may have negative consequences. For example, surgeons who maintain eye contact with patients have significantly higher rates of PTSD than surgeons who do not maintain eye contact with patients (Warren, Jones, Shafi, Roden-Foreman, Bennett & Foreman, 2013).

Moreover, although attention is a mechanism which functions at a conscious level of analysis, there may be other mechanisms that function outside of consciousness, which produce the changes in attentional processing. For example, changes in hormones such as oxytocin and testosterone may drive the attentional changes. Work on autistic patients, who show abnormal patterns of attention when attending to faces, documents that autism is associated with atypical levels of these hormones (Falter, Plaisted & Davis, 2008). Further work demonstrates that increasing levels of oxytocin increases gaze to the eye region of human faces (Guastella, Mitchell & Dadds, 2008). If hormones are driving changes in attentional deployment it further complicates whether perceptual dehumanization is an intentional or unintentional action.

In closing it is worth noting the broader theoretical implications of this work. This work suggests that social functionalism may provide researchers in social cognition a potentially fruitful avenue of theorizing. There are deep complementary aspects of social functionalism and cognitive structuralism. Social functionalism builds on the premise that human beings are indeed deeply social creatures and focuses on why questions: the adaptive challenges of coping with an extraordinary range of cultural-historical environments. What do people need to do to survive and thrive in collectivities regulated by complex accountability relationships, norms and values? In contrast, cognitive structuralism builds upon the assumption that the complex circuitry of the brain can be understood as a computational system. It focuses on mechanism: “how” questions. Whereas social functionalism highlights the larger context within which perception and cognition occur, it fails—left to its own devices--to identify the exact, nature of these perceptual and cognitive processes and how they connect to the solution of recurring adaptive problems.

APPENDIX

Study 1.1

Instructions:

In the following study you will be asked to complete an association test.

You will see photographs of people each paired with a descriptions of an action that individual performed. Your task is to remember the action each individual performed.

During the first phase you will see a photograph of one person at a time. Underneath each picture, you will see a description of an action or behavior in which that person has engaged.

You will see three blocks of 12 person-behavior pairings. You will see each person-behavior pairing displayed on screen for 8.5 seconds. The slide will automatically advance to next pair. Do not click on anything.

After all 12 person-action pairings have been displayed, you will be tested on you ability to recall the pairings.

During the recall phase you will see all 12 people on screen at once.

Each behavior will be displayed underneath the array of people one at a time.

Your task is to determine which person performed each action by indicating the number that corresponds to the correct person.

The task is very hard. You may not always know the answer. If you do not know the answer, guess. You must answer every question.

Actions:

Robbery of $100,000 of Art

Killed two individuals

Committed first degree murder

Committed Assault

Committed first degree rape

Kidnapped and held someone hostage for a year

Committed Domestic Violence (broke wife's arm and jaw)

Theft of $50,000 in goods

Embezzlement of $100,000

Property Destruction ($50,000 in damages)

Fraud ($75,000 in damages)

Burglary of $10,000 in goods and services

Armed Robbery of $25,000 of goods.

Extortion of $15,000

Blackmail Congressman for $100,000

Commercial Bribery and Kickbacks for over $50,000

Counterfeiting of $35,000 in products

Trafficking of $100,000 of drugs

Sexual Exploitation of Minors for $50,000 profit

Committed treason for 2 years

Espionage

Providing Material Support to Designated Foreign Terrorist Organizations

Smuggled a Chemical Weapons of Weapons of Mass Destruction into country

Committed arson and destroyed a house

Donated $300,000 to a Museum

Saved two individuals from drowning

Saved an individuals life

Cared for sick friend

Donated $100,000 to a fund against RAPE

Cared for sick friend

Donated $180,000 to a domestic violence fund

Donated $150,000 to education initiative

Donated $300,000 to hospital

Donated $150,000 to habitat for humanity

Donated $250,000 to music education

Donated $50,000 to medical research

Donated $75,000 to police fund

Donated $45,000 to fight Malaria

Donated $500,000 to fight political corruption

Donated $150,000 to homeless shelter

Donated $100,000 to arts education

Donated $300,000 to drug rehabilitation programs

Donated $150,000 to victims of sexual assault fund

Worked in public service for his country for 10 years

Worked in public service for his country for 35 years

Worked in anti-terrorist organization for 20 years

Worked in counter-terrorist task force for 50 years

Built 3 houses for habitat for humanity

walked his dog

fed his cat

cooked dinner

took a shower

washed clothing

vacuumed floor

cleaned house

read a book

passed the bar

ate an snack

ate a steak

watched movie

took clothing to a local drycleaner

watched a Clockwork Orange yesterday

Read an autobiography of George Washington

walked his King Charles Caviler Spaniel

Attended Yale university School of law

Ate a sliced gala apple

took suit to be altered

watched the movie It's a Wonderful Life

Took a vacation to Paris

Took a vacation to Hawaii

Allows dog to sleep on Sofa

Ate a turkey and Swiss sandwich for lunch yesterday

Study 1.2

Instructions:

In the following study you will be asked to complete an association test.

You will see photographs of people each paired with a descriptions of an action that individual performed. Your task is to remember the action each individual performed.

During the first phase you will see a photograph of one person at a time. Underneath each picture, you will see a description of an action or behavior in which that person has engaged.

You will see two blocks of 10 person-behavior pairings. You will see each person-behavior pairing displayed on screen for 12 seconds. The slide will automatically advance to next pair. Do not click on anything.

After all 10 person-action pairings have been displayed, you will be tested on you ability to recall the pairings.

During the recall phase you will see all 10 people on screen at once.

Each behavior will be displayed underneath the array of people one at a time.

Your task is to determine which person performed each action by indicating the number that corresponds to the correct person.

The task is very hard. You may not always know the answer. If you do not know the answer, guess. You must answer every question.

Actions:

Robbery of $100,000 of Art

Killed two individuals

Committed first degree murder

Assault

Commmitted first degree rape

Kidnapped and held someone hostage for a year

Comitted Domestic Violence (broke wifes arm and jaw)

Theft of $50,000 in goods

Embezzlementof $100,000

Armed Robbery of $25,000 of goods.

Blackmail Congressman for $100,000

Commercial Bribery and Kickbacks for over $50,000

Counterfeiting of $35,000 in products

Trafficking of $100,000 of drugs

Sexual Exploitation of Minors for $50,000 profit

Committed treason for 2 years

Espionage

Providing Material Support to Designated Foreign Terrorist Organizations

Smuggled a Chemical Weapons of Weapons of Mass Destruction into country

Committed arson and destroyed a house

Donated $300,000 to a Museum

Saved two individuals from drowning

Saved an individuals life

Cared for sick friend

Donated $100,000 to a fund against RAPE

Cared for sick friend

Donated $180,000 to a domestic violence fund

Donated $150,000 to education inititive

Donated $250,000 to music education

Donated $50,000 to medical research

Donated $500,000 to fight political corruption

Donated $150,000 to Hospital

Donated $100,000 to arts education

Donated $300,000 to drug rehabilitation programs

Donated $150,000 to victims of sexual assault fund

Worked in public service for his country for 10 years

Worked in public service for his country for 35 years

Worked in anti-terrorist organization for 20 years

Worked in counter-terrorist task force for 50 years

Built 3 houses for habitat for humanity

Study 1.3

Instructions:

In this study your task is to determine if the top half of two different faces match.

The study requires that you pay careful attention. The experiment will advance automatically at a rapid pace. You will be asked to make responses using your keyboard.

Prior to completing the matching task, you will learn some background information about the people whose faces you are about to see.

Specifically you will read about crime which occurred. One of the individuals is the victim one of the individuals is the perpetrator.

After you read about the crime you will perform a perceptual recognition task involving each of the actors.

You will perform this recognition task for each of the two actors separately.

In the recognition task you will first see a photograph of one of the actors described in the background information.

You will then see a second photograph. Your task is to determine if the two top-halves of the sequentially presented pairs of faces are the same or different.

After you have seen both faces you will be asked indicate if the top half of the two face is the same.

On this screen respond using your keyboard.

If the top half of the two photos is the same, respond by pressing F on your keyboard.

If the top half of the two photos is different, respond by pressing J on your keyboard.

Do not respond before the response screen!

Comprehension questions:

Participants were required to answer all three questions correctly in order to move on to the task.

Your task is to determine if:

- If the two sequentially presented photos are the same
- If the bottom half of the two sequentially presented photos are the same
- If the top half of the two sequentially presented photos are the same

F indicates the two photos are:

- the same
- different

J indicates the two photos are:

- the same
- different

Actions:

Aaron stole $100,000 from William

Casey killed Luis

Robert killed Jose

Adam assaulted Dustin

John raped Jeffrey

Jose kidnapped and held Nathaniel hostage

Raymond stole of $50,000 in goods from Aaron

Keith embezzled $50,000 from Nathan

Alex blackmail $100,000 from Gary

Edward stole $100,000 from Wesley

Joseph killed Daniel

Joel killed Christopher

Brandon assaulted Jesse

Brent raped Vincent

Sean kidnapped and held hostage Derek

Joseph stole of $50,000 in goods from Kyle

Joel embezzled $90,000 from Vincent

Brandon blackmail $9,000 from Derek

Derek stole $197,000 from Douglas

Kyle killed Shawn

Phillip killed Derrick

Thomas assaulted Jonathan

Philip raped Michael

Nicholas kidnapped and held hostage Jeremy

Travis stole of $53,000 in goods from Marcus

Alexander embezzled $59,000 from Evan

Eric blackmail $100,000 from Shane

Andrew stole $134,000 from Donald

Bryan killed Steven

Carlos killed Benjamin

Charles assaulted George

Juan raped Peter

Gregory kidnapped and held Jordan hostage

Jason stole of $50,000 in goods from Cody

Antonio embezzled $70,000 from James

Adrian blackmail $250,000 from Aaron

Kevin stole $760,000 from Tyler

Trevor killed Kenneth

Brett killed Chad

Raymond assaulted Nathan

Keith raped Gary

Alex kidnapped and held Wesley hostage

Edward stole of $80,000 in goods from Daniel

Joseph embezzled $53,000 from Christopher

Joel blackmail $800,000 from Jesse

Brandon stole $172,000 from Vincent

Brent killed Derek

Sean killed Kyle

Frank assaulted Phillip

Zachary raped Thomas

Nathaniel kidnapped and held Philip hostage

David stole of $70,000 in goods from Sean

Anthony embezzled $5,000 from Frank

Christian blackmail $10,000 from Zachary

Curtis stole $1,000 from Ronald

Mark killed Paul

Erik killed Corey

Victor assaulted Matthew

Seth raped Gabriel

Richard kidnapped and held Brian hostage

Austin stole of $500,000 in goods from Scott

Bradley embezzled $5,000 from Craig

Cory blackmail $10,000 from Jacob

Study 1.4

Instructions:

In this study your task is to determine if the top half of two different faces match.

The study requires that you pay careful attention. The experiment will advance automatically at a rapid pace. You will be asked to make responses using your keyboard.

Prior to completing the matching task, you will learn some background information about the people whose faces you are about to see.

Specifically you will read about harm, which occurred, which occurred.

After you read about the harm you will perform a perceptual recognition task involving the perpetrator of the harm.

In the recognition task you will first see a photograph of the perpetrator of the harm.

Your task is to determine if the two top-halves of the sequentially presented pairs of faces are the same or different.

After you have seen both faces you will be asked indicate if the top half of the two faces are the same.

On this screen respond using your keyboard.

If the top half of the two photos is the same, respond by pressing F on your keyboard.

If the top half of the two photos is different, respond by pressing J on your keyboard.

Do not respond before the response screen!

Comprehension questions:

Participants were required to answer all three questions correctly in order to move on to the task.

Your task is to determine if:

- If the two sequentially presented photos are the same
- If the bottom half of the two sequentially presented photos are the same
- If the top half of the two sequentially presented photos are the same

F indicates the two photos are:

- the same
- different

J indicates the two photos are:

- the same
- different

Actions:

intentionally shot his brother

intentionally shot his father

Intentionally started a fire that killed someone

Accidentally shot his wife

Intentionally killed his sister in a car accident

Intentionally started a fire that killed his wife

Accidentally shot and killed a woman in war

Intentionally killed someone by feeding her something to which they were highly allergic.

Accidentally poisoned his father

Accidentally shot his brother

Accidentally pushed someone off a train, he died

Accidentally killed his brother in a car accident

Intentionally started a fire that killed three people

Intentionally electrocuted someone.

Accidentally pushed someone off a boat, he died.

Accidentally mislabeled pills to cause someone to overdose on pain medication and die

intentionally shot his sister

Intentionally killed someone by running them over with car

Accidentally killed his sister in a car accident

Accidentally killed someone by running them over with a motor boat

Accidentally shot his cousin

Intentionally strangled his sister

Accidentally decapitated someone with a boat

Intentionally pushed someone off a train, he died

Accidentally shot his mother

Intentionally shot and killed a woman in war

Intentionally shot and killed a child in war

Intentionally strangled his wife

Accidentally killed someone by drowning them

Accidentally shot someone

Intentionally killed someone by drowning them

Intentionally killed his brother in a car accident

intentionally shot his mother

Intentionally poisoned someone

Intentionally hit and killed someone with car

Intentionally pushed someone off a boat, he died.

Accidentally started a fire that killed his family

Accidentally hit and killed someone with car

Intentionally killed someone a boat

Accidentally strangled his wife

intentionally shot his cousin

Intentionally strangled someone

Accidentally shot his sister

Accidentally started a fire that killed his wife

Intentionally decapitated someone with a boat

Accidentally poisoned his brother

Accidentally shot and killed a child in war

Accidentally strangled his sister

Accidentally electrocuted someone.

intentionally shot someone

Accidentally poisoned someone

intentionally shot his wife

Accidentally started a fire that killed someone

Accidentally killed someone a boat

Accidentally shot his father

Intentionally killed someone by running them over with a motor boat

Intentionally poisoned his brother

Intentionally poisoned his father

Intentionally started a fire that killed his family

Intentionally mislabeled pills to cause someone to overdose on pain medication and die

Accidentally killed someone by running them over with car

Accidentally started a fire that killed three people

Accidentally killed someone by feeding her something to which they were highly allergic.

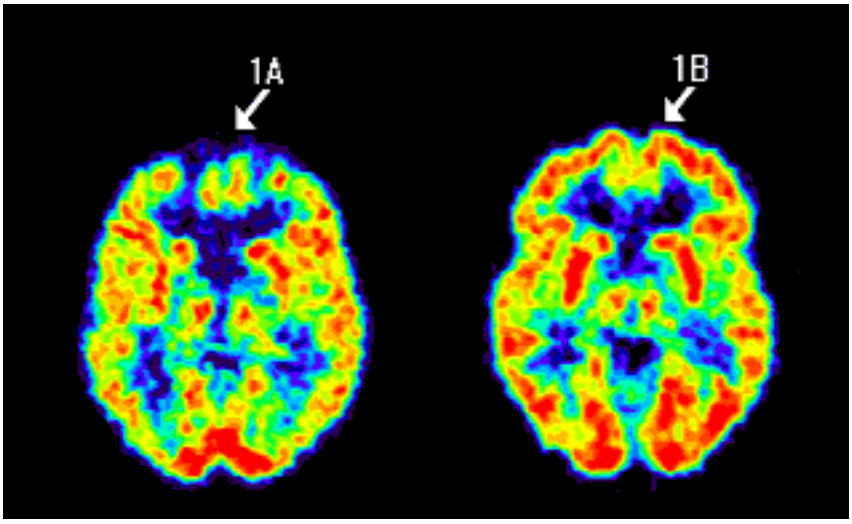
Accidentally strangled someone

Study 1.5

Manipulation:

Unlike pedophilia where the scientific evidence fails to indicate biological roots, impulsive violent and aggressive behavior has been shown to have a biological basis. The actions committed by violent men are largely biologically predetermined and nearly impossible for them to prevent in spite of their best intentions. Like a homosexuality, scientific research indicates this is unchangeable.

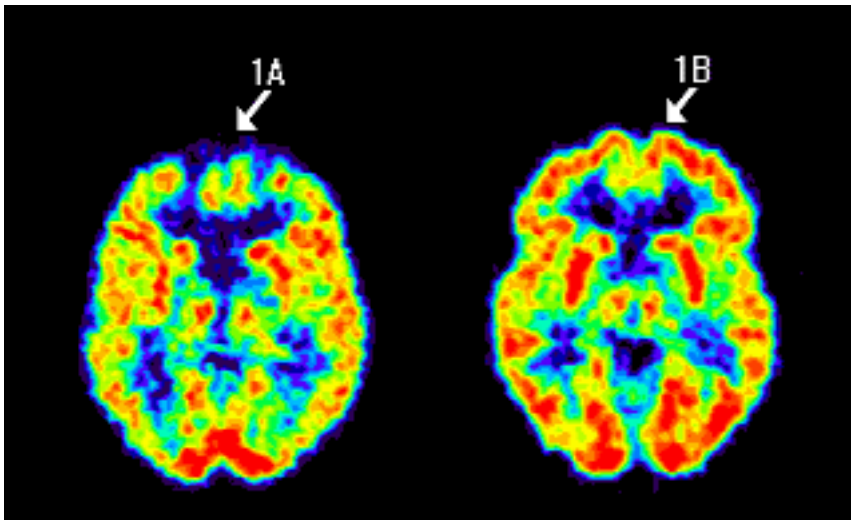
Scientific data indicates that the men who commit impulsive, violent crimes do so because of a genetic defect was located to the X chromosome in the region of p11-12; a point mutation was identified in the eighth exon of the monoamine oxidase A (MAOA) structural gene. Early childhood maltreatment and abuse activate the gene which leads to changes glutamine to a termination codon, a low concentrations of 5-hydroxyindole-3-acetic acid (5-HIAA) and other MAOA-breakdown products. This leads to a smaller subgenual cortex and a 5 to 10 percent reduction in brain density in portions of the paralimbic system, the orbitofrontal cortex and the caudate, reduced white matter in the medial prefontal and increased grey matter in the orbital gyrus causing impulsive bouts of aggression.



Unlike violent and aggressive behavior, where the scientific evidence fails to indicate biological roots, pedophilia has been shown to have a biological basis. The actions committed by pedophiles are largely biologically predetermined and nearly impossible for them to prevent in spite of their best intentions. Like a homosexuality, scientific research indicates this is unchangeable.

Scientific data indicates that the men who commit pedophilia do so because of a genetic defect was located to the X chromosome in the region of p11-12; a point mutation was identified in the eighth exon of the monoamine oxidase A (MAOA) structural gene. Early childhood maltreatment and sexual abuse activate the gene which leads to changes glutamine to a termination codThis

leads to a smaller subgenual cortex and a 5 to 10 percent reduction in brain density in portions of the paralimbic system, the orbitofrontal cortex and the caudate, reduced white matter in the medial prefontal and increased grey matter in the orbital gyrus causing pedophilia.



Study 6

"What would be an appropriate jail or prison sentence for X?" A unique 13-point scale adopted from the justice-research literature (Darley et al, 2001; Carlsmith et al, 2002). It ranged from "No sentence" to "Death sentence" with non-linear intervals given in weeks, months, and years.

No sentence	2 weeks	3 months	6 months	1 year	5 years	10 years	15 years	25 years	35 years	45 years	Life in prison	Death sentence

This scale is based on psychometric research suggesting that people perceive the difference between a 6-month sentence and a 1-year sentence as roughly equivalent to the difference between 1 years and 5 years.

Study 2.1

Instructions:

In the following study you will be asked to complete an association test.

You will see photographs of people displayed above their name. Your task is to remember each person's name.

During the first phase you will see a photograph of one person at a time. Underneath each picture, you will see the person's name

You will see three blocks of 10 person-name pairings. You will see each person-name pairing displayed on screen for 12.5 seconds. The slide will automatically advance to next pair. Do not click on anything.

After all 10 person-name pairings have been displayed, you will be tested on you ability to recall the pairings.

During the recall phase you will see all 10 people on screen at once.

Each name will be displayed underneath the array of people one at a time.

Your task is to determine which person corresponds to each name indicating the number that corresponds to the correct person.

The task is very hard. You may not always know the answer. If you do not know the answer, guess. You must answer every question.

Study 2.2

Instructions:

In the following study you will be asked to complete an association test.

You will see photographs of people displayed above their name. Your task is to remember each person's name.

During the first phase you will see a photograph of one person at a time. Underneath each picture, you will see the person's name

You will see three blocks of 6 person-name pairings. You will see each person-name pairing displayed on screen for 9 seconds. The slide will automatically advance to next pair. Do not click on anything.

After all 6 person-name pairings have been displayed, you will be tested on you ability to recall the pairings.

During the recall phase you will see all 6 people on screen at once.

Each name will be displayed underneath the array of people one at a time.

Your task is to determine which person corresponds to each name indicating the number that corresponds to the correct person.

The task is very hard. You may not always know the answer. If you do not know the answer, guess. You must answer every question.

Instructions:

In this study your task is to determine if the top half of two different faces match.

The study requires that you pay careful attention. The experiment will advance automatically at a rapid pace. You will be asked to make responses using your keyboard.

All of the individuals you will see are a part of U.S. army. Prior to completing the matching task, you will learn will learn what their role is in the United States Armed forces.

After you read about their role you will perform a perceptual recognition task for the individual you just learned about.

In the recognition task you will first see a photograph of them.

Your task is to determine if the two top-halves a second photograph is the same or different than the first actors face

After you have seen both faces you will be asked indicate if the top half of the two faces are the same.

On this screen respond using your keyboard.

If the top half of the two photos is the same, respond by pressing F on your keyboard.

If the top half of the two photos is different, respond by pressing J on your keyboard.

Do not respond before the response screen!

Comprehension questions:

Participants were required to answer all three questions correctly in order to move on to the task.

Your task is to determine if:

- If the two sequentially presented photos are the same
- If the bottom half of the two sequentially presented photos are the same
- If the top half of the two sequentially presented photos are the same

F indicates the two photos are:

- the same
- different

J indicates the two photos are:

- the same
- different

Study 2.5

One [20] Americans were kidnapped in southern Algeria by a terrorist group affiliated with Al Qaeda. The kidnapping was done for ransom in order to finance the organizations terrorist activity (such as the world trade center attacks). The group demands a ransom from the country of citizenship of the hostages or they will publically torture and execute the hostages.

In previous cases where ransoms have been paid for two people have ranged between $1,000,000-$4,000,000 (USD). What is the maximum ransom you would be willing to pay in US dollars?

Actions used in Chapter 3

Actions:

intentionally shot his brother

intentionally shot his father

Intentionally started a fire that killed someone

Accidentally shot his wife

Intentionally killed his sister in a car accident

Intentionally started a fire that killed his wife

Accidentally shot and killed a woman in war

Intentionally killed someone by feeding her something to which they were highly allergic.

Accidentally poisoned his father

Accidentally shot his brother

Accidentally pushed someone off a train, he died

Accidentally killed his brother in a car accident

Intentionally started a fire that killed three people

Intentionally electrocuted someone.

Accidentally pushed someone off a boat, he died.

Accidentally mislabeled pills to cause someone to overdose on pain medication and die

intentionally shot his sister

Intentionally killed someone by running them over with car

Accidentally killed his sister in a car accident

Accidentally killed someone by running them over with a motor boat

Accidentally shot his cousin

Intentionally strangled his sister

Accidentally decapitated someone with a boat

Intentionally pushed someone off a train, he died

Accidentally shot his mother

Intentionally shot and killed a woman in war

Intentionally shot and killed a child in war

Intentionally strangled his wife

Accidentally killed someone by drowning them

Accidentally shot someone

Intentionally killed someone by drowning them

Intentionally killed his brother in a car accident

intentionally shot his mother

Intentionally poisoned someone

Intentionally hit and killed someone with car

Intentionally pushed someone off a boat, he died.

Accidentally started a fire that killed his family

Accidentally hit and killed someone with car

Intentionally killed someone a boat

Accidentally strangled his wife

intentionally shot his cousin

Intentionally strangled someone

Accidentally shot his sister

Accidentally started a fire that killed his wife

Intentionally decapitated someone with a boat

Accidentally poisoned his brother

Accidentally shot and killed a child in war

Accidentally strangled his sister

Accidentally electrocuted someone.

intentionally shot someone

Accidentally poisoned someone

intentionally shot his wife

Accidentally started a fire that killed someone

Accidentally killed someone a boat

Accidentally shot his father

Intentionally killed someone by running them over with a motor boat

Intentionally poisoned his brother

Intentionally poisoned his father

Intentionally started a fire that killed his family

Intentionally mislabeled pills to cause someone to overdose on pain medication and die

Accidentally killed someone by running them over with car

Accidentally started a fire that killed three people

Accidentally killed someone by feeding her something to which they were highly allergic.

Accidentally strangled someone

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INDEX

Tables

Table 1.1

Convergent Operationalizations of Perceptual Dehumanization

Task *(Mechanism Impaired)*	Description	Negative Task Features	Confounds Controlled for
Facial Inversion Effect *(Face-typical processing)*	In a recognition memory, task facial inversion is used to impair face-typical processing	The mechanism underlying the impairment is unclear and the task uses recall.	Task structure controls for response bias
Low Frequency Resolution *(Featural processing)*	In a recognition memory task removal of high spatial frequency information impairs featural processing	A recognition recall paradigm.	Effects are in the opposite direction, controlling for any attentional effects (controlling for attentional effects).
Facial Composite Task *(Holistic processing)*	In a task facial offsetting is used to impair holistic processing	The ”partial” design may be associated with a response bias	Clearest manipulation of holistic processing Uses a perceptual matching task

Note. Table 1.1 documents the strengths and weaknesses of each of the methods used to impair holistic processing.

Table 1.2

Convergent Evidence for Perceptual Dehumanization

Category	Perceptual effects	Dehumanization	Discrimination
Race	Michel, Rossion, Han, Chung, and Caldara, 2006; Rhodes, Hayward & Winkler, 2006; Tanaka, Kiefer & Bukach, 2004	Jahoda, 1999; Cuddy., Rock, & Norton, 2007	Ayres, 1991; Milkman, L., Akinola, & Chugh, 2012; Norton, Vandello, & Darley, 2004
Group	Bernstein, Young, & Hugenberg, 2007; Hugenberg, & Corneille, 2009;	Bar-Tal, 2000; Castano, & Giner-Sorolla, 2006; Vaes, Paladino, Castelli, Leyens, & Giovanazzi, 2003	Tajfel, 1970
Gender	Bernard, Gervais, Allen, Campomizzi, & Klein 2012	Nussbaum, 1999; Fredrickson & Roberts, 1997;	MacKinnon, 1987; Norton, Vandello, & Darley, 2004
Dominate Group	Shriver, Young, Hugenberg, Bernstein, and Lanter, 2008	Hodson,& Costello, 2007	Sidanius, & Pratto, 2001

Note. Table 1.2 documents the co-occurrence between the attenuation of face typical processing and the mistreatment of social groups.

Table 2.1

Elicitation conditions of three forms of dehumanization

Group	**Dehumanization**	**Infra-humanization**	**Perceptual Dehumanization**
Enemy Out-groups	✔	✔	✔
Norm Violators	✔	✔	✔
Subordinate Out Groups	✔	✔	✔
Out Groups		✔	✔
Minimal Groups			✔
Civil Servants			✔

Note. Table 2.1 documents commonalities and differences in the conditions under which classic dehumanization, infrahumanization and perceptual dehumanization occur.

Table 3.1

Levels of Analysis of Perceptual Dehumanization

Abstract Level	**Temporal Scale**	**Example**	**Operationalization**
Behavioral	< 3 sec	Physical harm	Behavior
Social/Cognitive	2-3 Sec	Explicit attitude	Self report
Embodiment	300ms	Failure to attend to eyes	Eye movements
Perceptual	150ms	Inhibition of face processing	Face specific processing
Neural	10ms	Lateral inhibition	Neural Circuit
Neural	1ms	Basic signal	Neural Spike

Note. Table 3.1 describes the psychological context in which the effects of perceptual dehumanization must be understood. It highlights the different levels of analysis which dehumanization effects and which effect perceptual dehumanization. It captures the hierarchical organization of the mind using stimulus time scale.

FIGURES

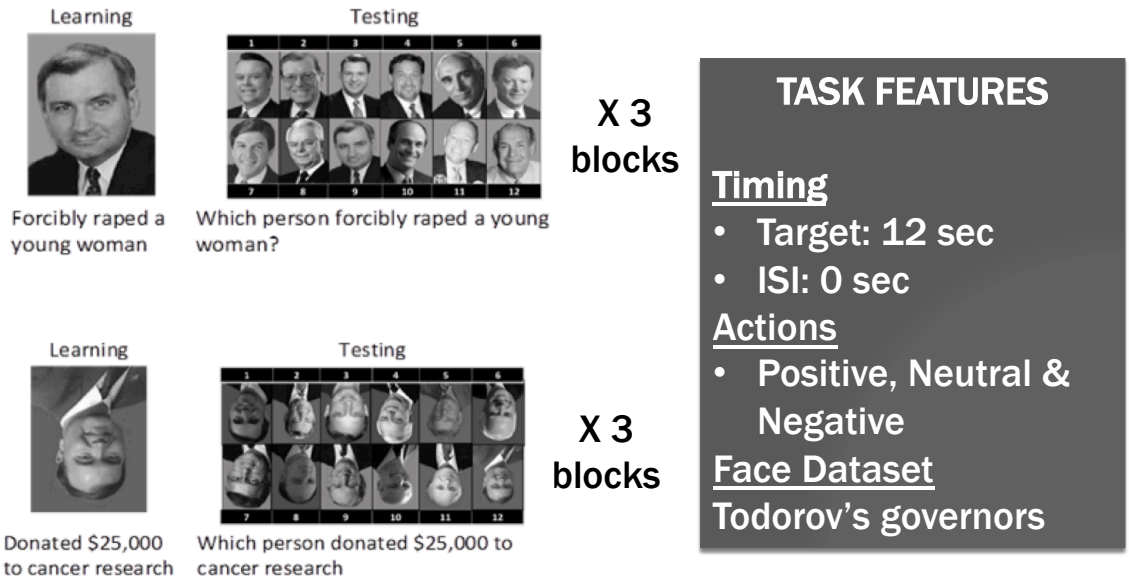

Figure 1.1. A description of the procedure of used in Study 1. In the learning phase individuals saw 12 face-action pairings. In the testing phase, individuals saw the 12 actions appear below the faces. Participants saw three blocks of upright faces and three blocks of inverted faces.

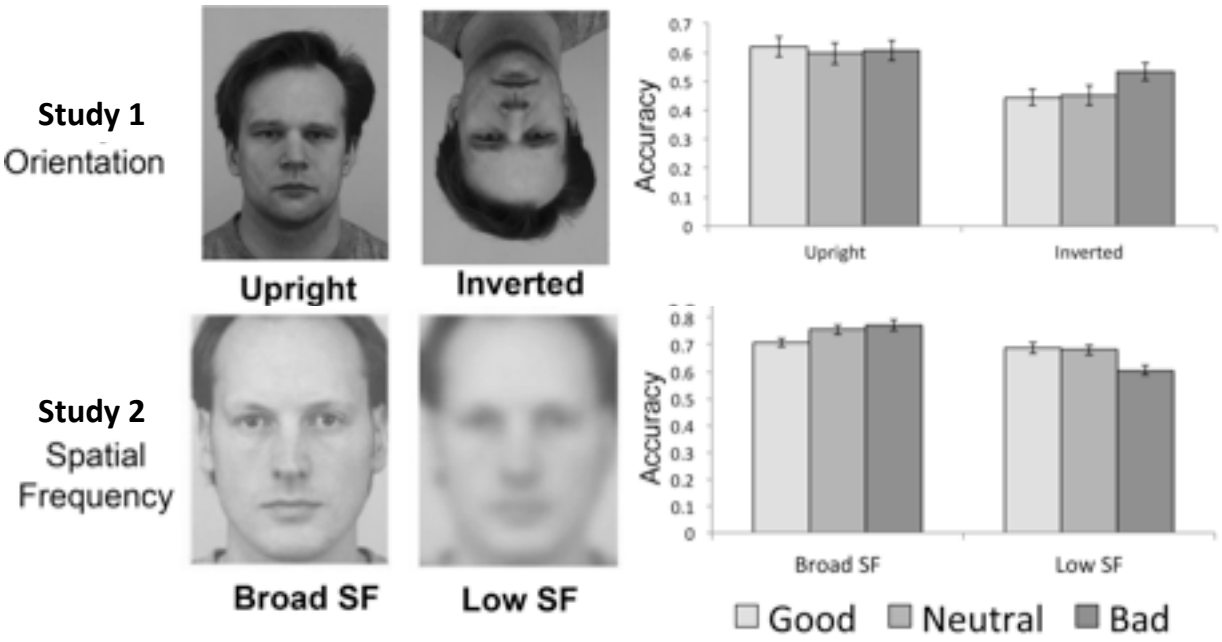

Figure 1.2. The results of studies 1 and 2 suggest faces of norm violators are processed atypically. Study 1 suggests that pairing faces with negative social information attenuates the effects of inversion. Study 2 demonstrates that pairing faces with negative acts magnifies the effect of high frequency spatial filters.

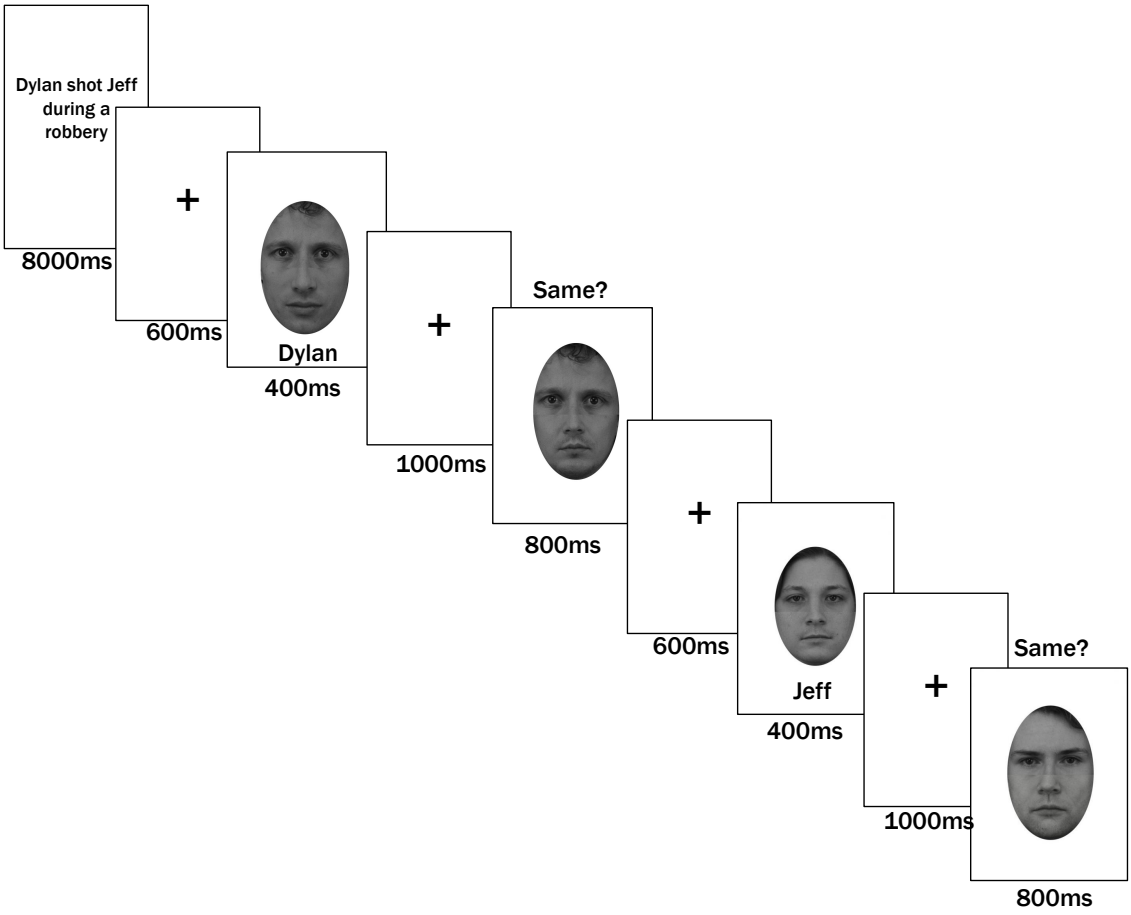

Figure 1.3. The procedure used in Study 3. The order of the victim and perpetrator of the action were randomized across participants. Participants indicated whether the top half of the faces matched by pressing a key.

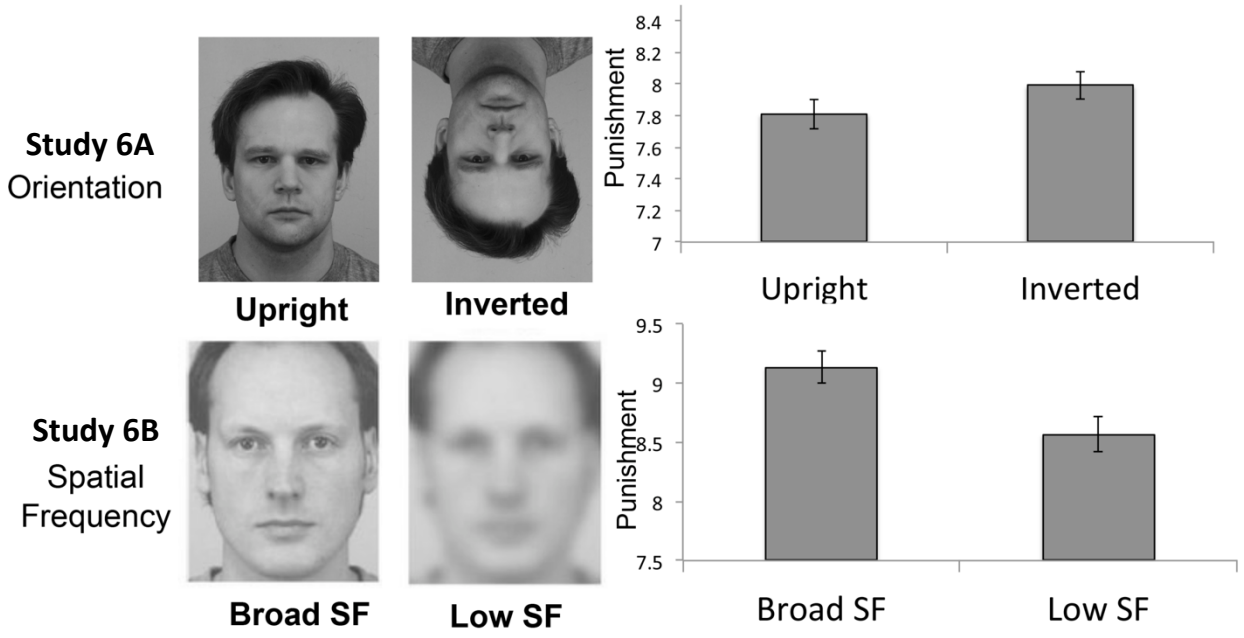

Figure 1.4. The results of studies 6A and 6B directly link perceptual dehumanization to an increased willingness to punish. Study 6A demonstrates inversion increases punitiveness. Study 6B demonstrates that low frequency spatial reduce punitiveness.

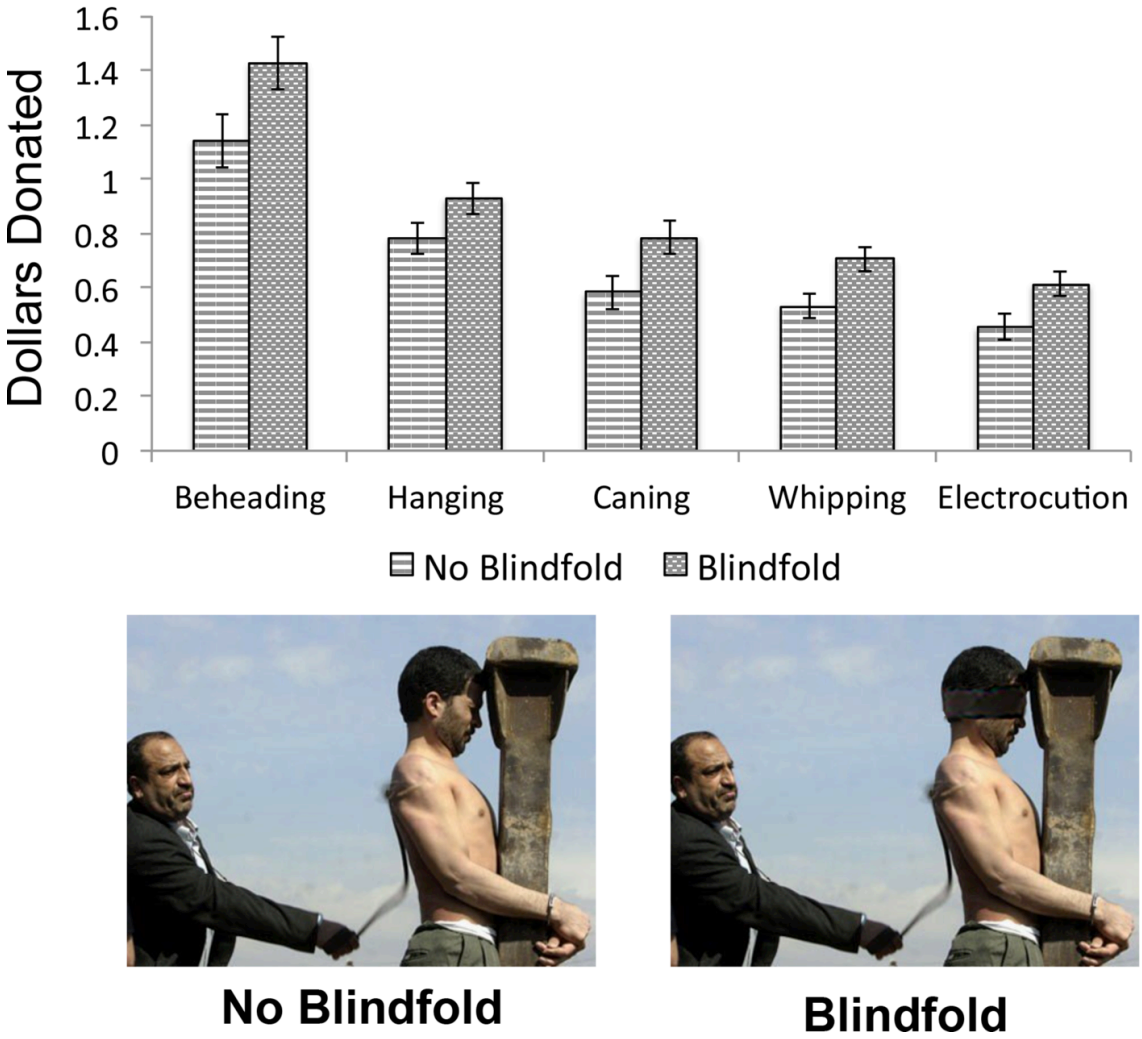

Figure 1.5. Study 7B demonstrates the effect of perceptual dehumanization in a real world context. Removing the eye information (blindfolding) norm violators reduces willingness to donate to stop severe punishments.

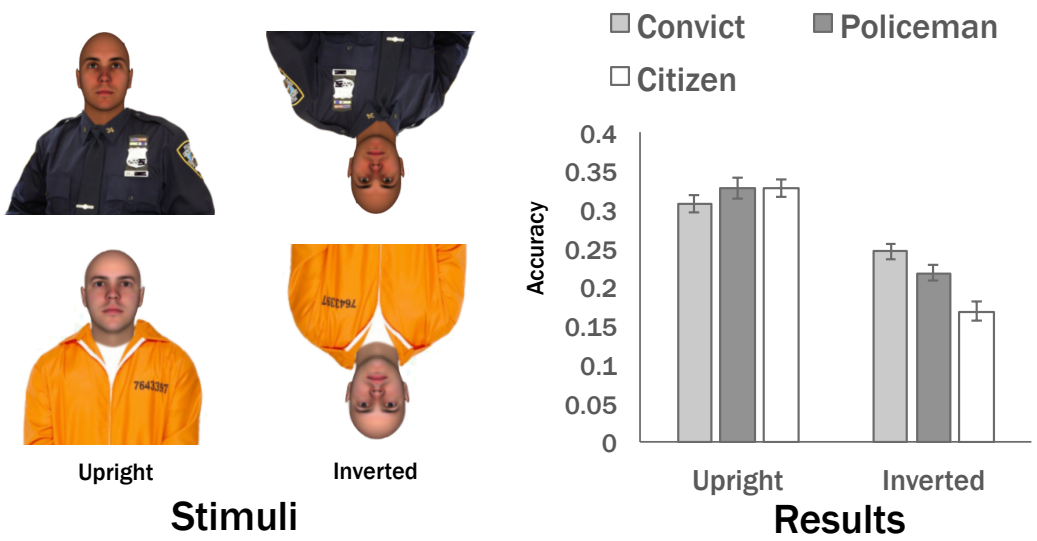

Figure 2.1 Study 1 suggests that dressing individuals as either convicts or policemen attenuate the effects of inversion relative to dressing them in ordinary attire (a blue or orange t-shirt).

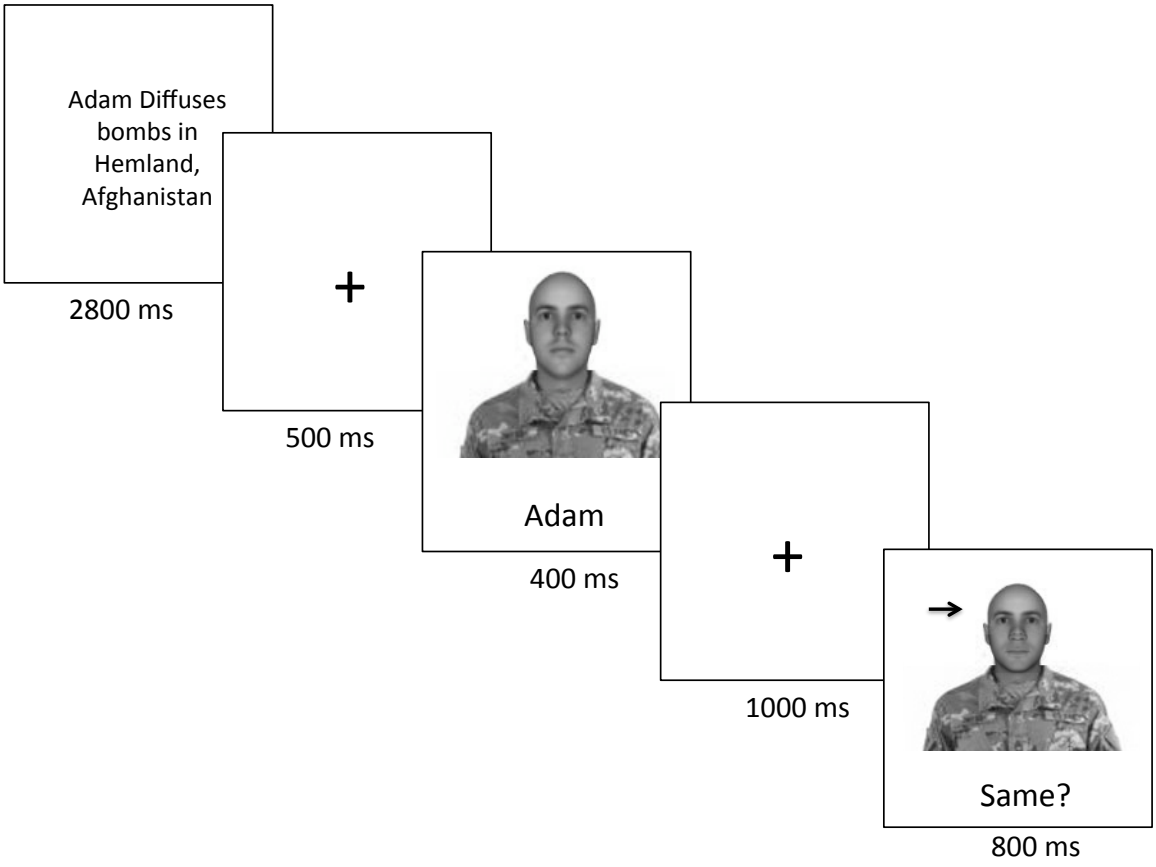

Figure 2.2. The procedure used in Study 4. Participants indicated whether the top half of the faces matched by pressing a key. High and low risk jobs, and intact and offset faces were interleaved.

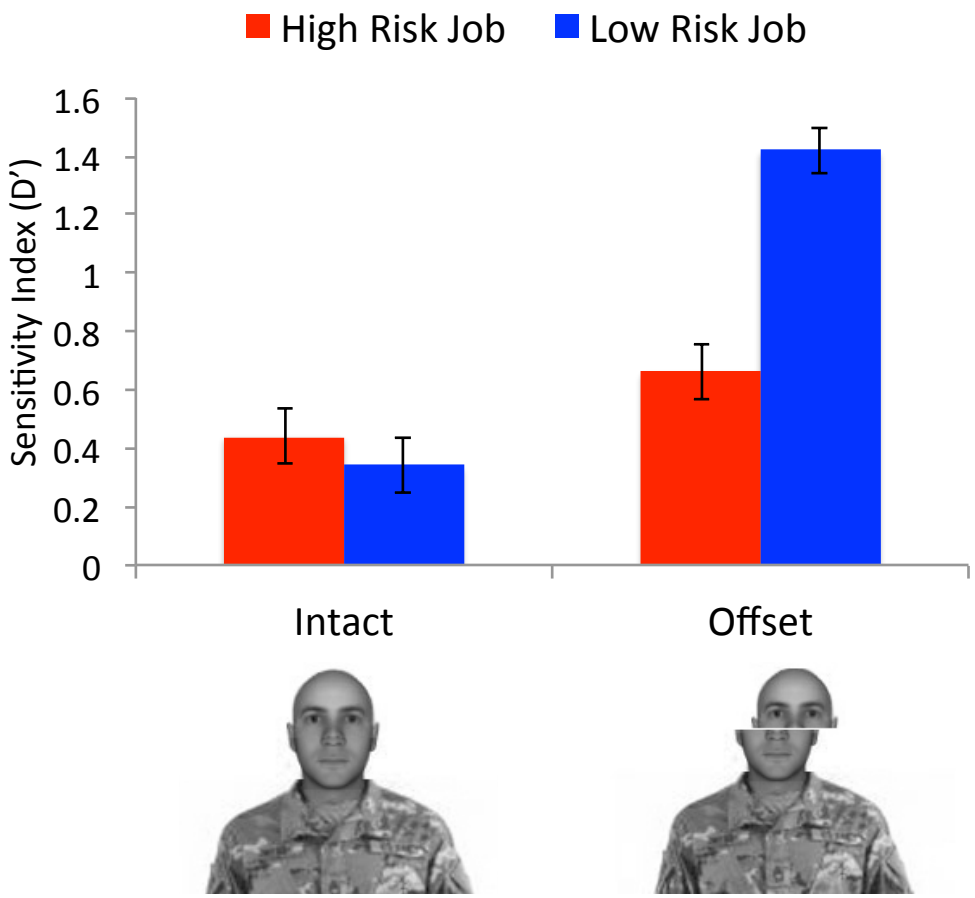

Figure 2.3. The results of study 4 suggest the faces of soldiers are only processed atypically if they are in high-risk jobs. In a perceptual matching task, the effect of offsetting was significantly greater for soldiers in low-risk jobs than soldiers in high-risk jobs.

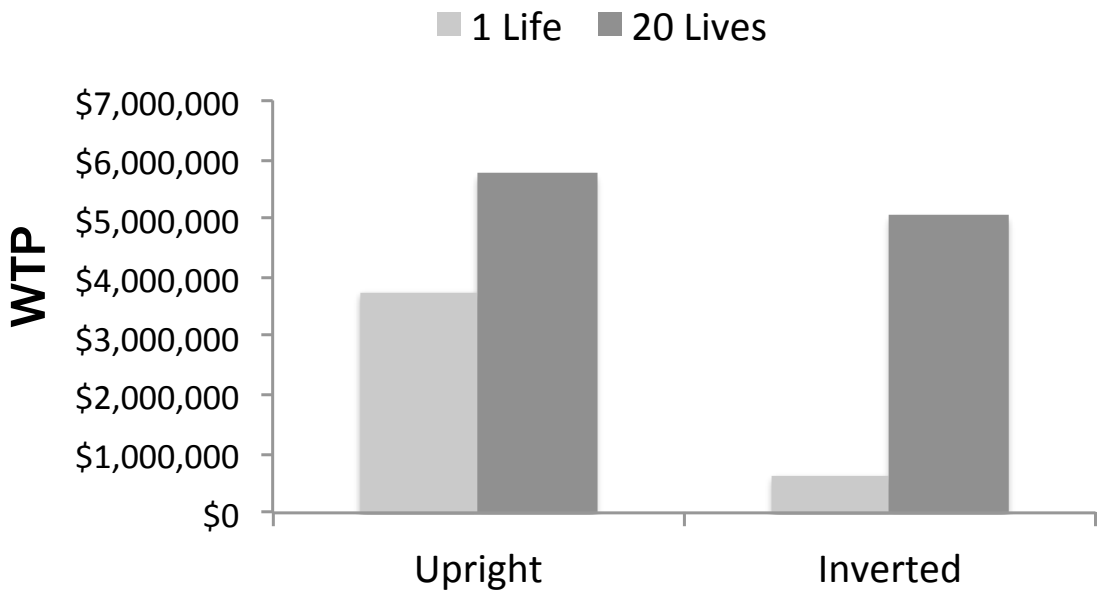

Figure 2.4. The results of studies 5 directly link perceptual dehumanization to an increased willingness to sacrifice soldiers for the greater good. Study 5 demonstrates that inversion decreases willingness to pay a ransom for a solider when their face is displayed as inverted rather than upright.

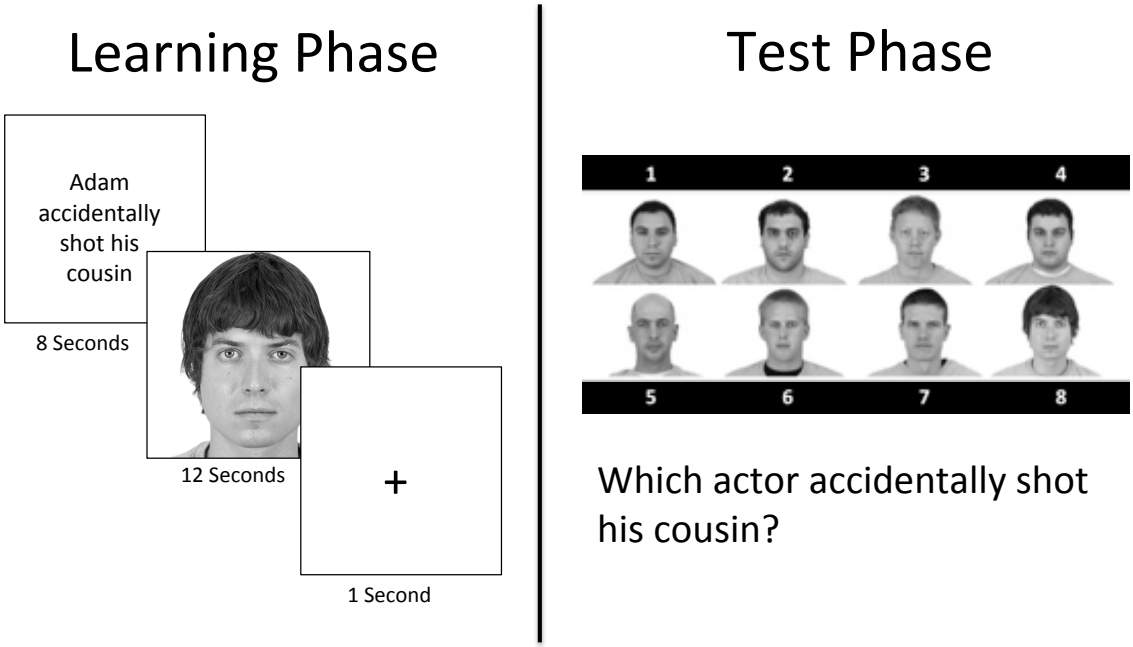

Figure 3.1. A description of the procedure of used in Study 1. In the learning phase individuals saw 6 face-action pairings. In the testing phase, individuals saw the 6 actions appear below the faces. Eye movements were recorded using a Tobii system.

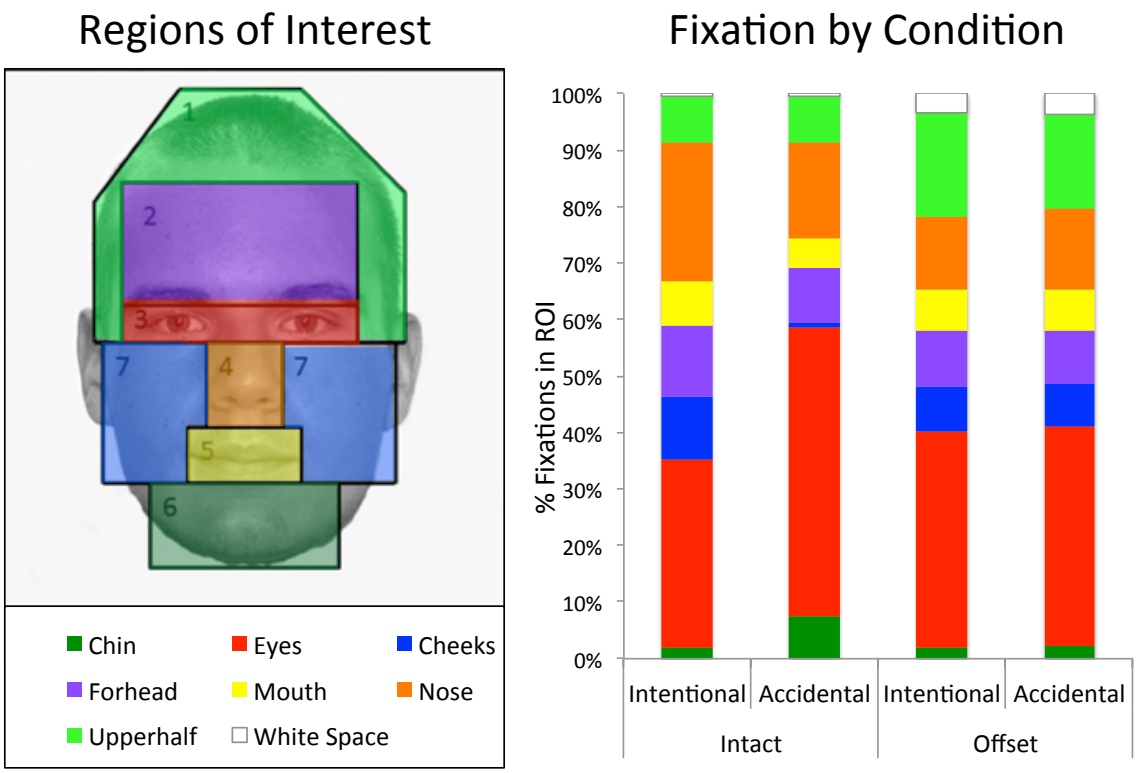

Figure 3.2. Panel A illustrates a schematic of the regions of interest used in analysis. Panel B illustrates the percentage of fixations occurring in each region of interest for each condition. The colors associated with an ROI on the schematic in Panel A represent the percentage of fixations in the ROI in Panel B.

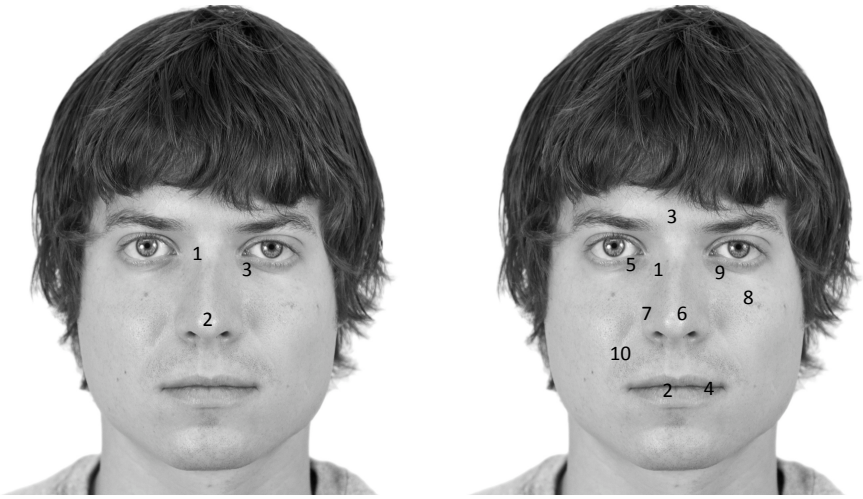

Figure 3.3. Panel A illustrates a sample fixation pattern from Study 2. The fixations points of fixation were computed from Study 1, based upon the "average" fixation points when the actor committed an unintentional harm. Panel B illustrates the fixation pattern from Study 3 for the same face. The fixations points were computed from Study 1, based upon the "average" fixation points when the actor committed an intentional harm.

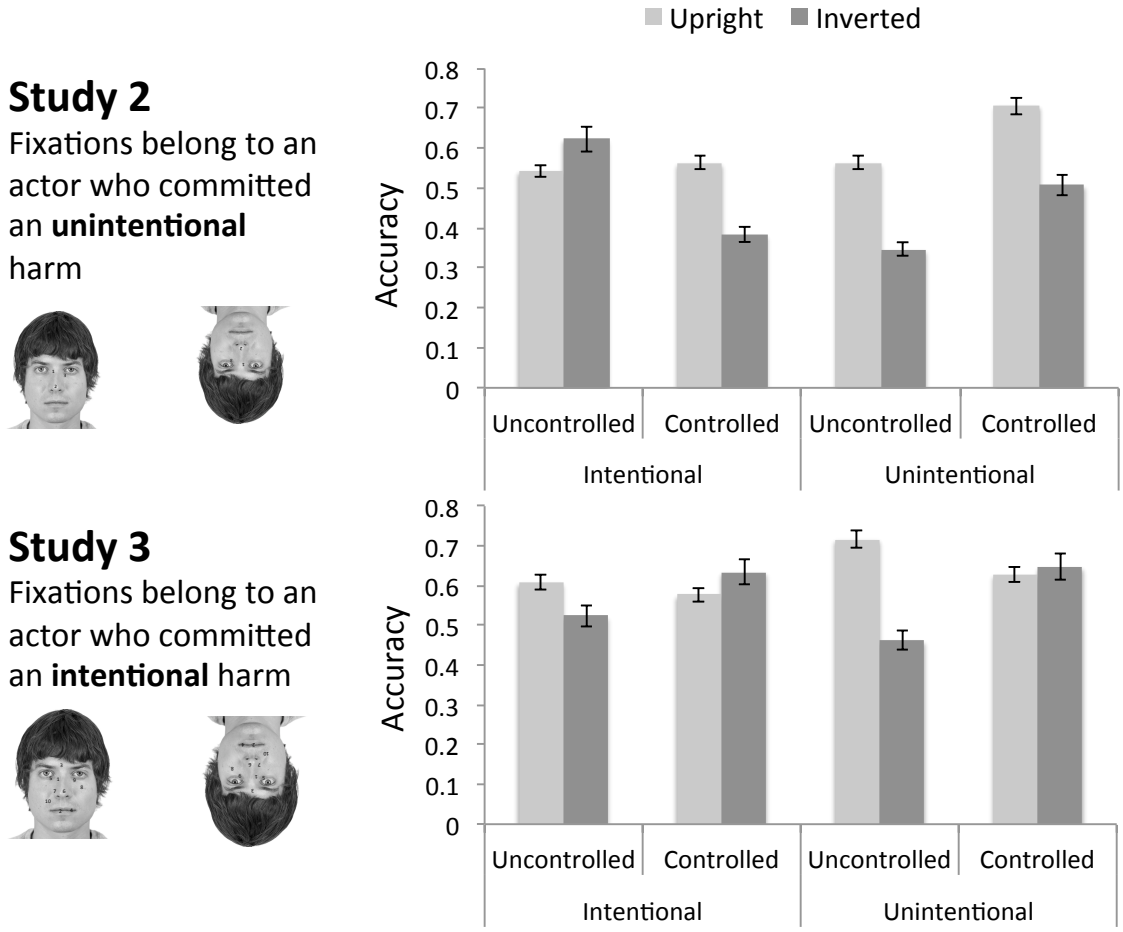

Figure 3.4. The results of studies 2 and 3 directly link visual fixation to attenuations in holistic processing. Study 2 demonstrates that adapting the fixation pattern associated with "norm followers" removes perceptual dehumanization—i.e. produces normal inversions effects—regardless of the moral status of the actor. Study 3 demonstrates that adapting the fixation pattern associated with "norm violators" leads to an attenuation in the holistic processing of faces—i.e. an attenuation of the facial inversions effects— regardless of the moral status of the actor.

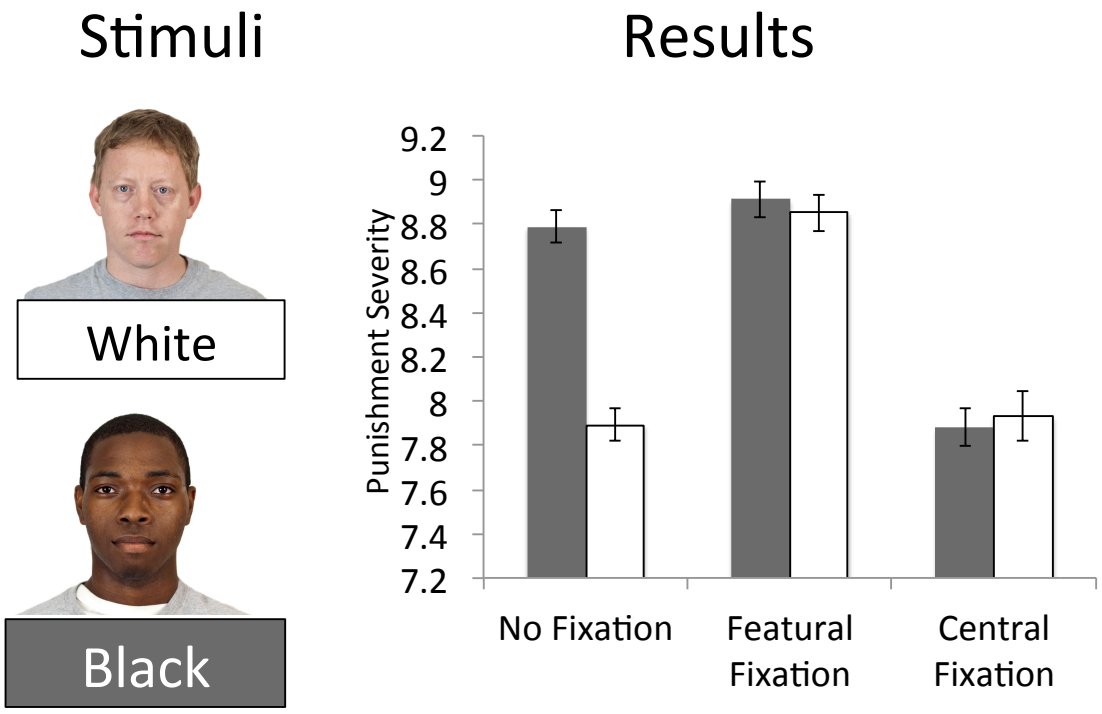

Figure3.5. Study 5 directly link visual fixations to an increased willingness to punish. Results suggest that punitiveness is significantly increased when participants fixate featurally and significantly decreased when participants fixate centrally. The effect of visual fixation on punishment depends upon the race of target.