

# DOES PHYSICAL ATTRACTIVENESS AND SEX IMPACT DECISIONS IN A THREAT DETECTION TASK

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## ABSTRACT

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The current study was conducted to investigate whether gender and physical attractiveness of face primes had any effect on subsequent categorization of weapons and non-weapons by participants. In Study 1 participants were required to rate a set of face photos of men and women on their level of attractiveness and also how threatening they perceived them to be. These photos were used for Study 2 as primes paired with weapons and non-weapons. One hundred and ten University of Canterbury students were required to categorise weapons from non-weapons after primed faces appeared on a computer screen. Adapted from the 'shooter paradigm' and priming studies, this aimed to discover participant's stereotypes when threat is involved. Specifically, it aimed to assess people's susceptibility to perceive a non-threatening item as a threat. Three possible theories are presented to explain the findings – the halo effect, the evolutionary intra-sexual competition theory, and the arousal theory. The results of study 1 indicated that there is a negative correlation between physical attractiveness and threat, such that as a target's physical attractiveness increases their perceived level of threat decreases, suggesting the existence of an overall halo effect (attractive people are non-threatening). The results of study 2 revealed an impact of female primes (in particular attractive female primes) on males' misclassification of non-weapons. There was no effect found of the primes on females' classifications. An arousal theory is used to explain this differential response. The results are discussed in terms of implications for the real-world and limitations of the study are outlined and suggestions are made regarding future research.

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## SECTION I – INTRODUCTION

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### 1.1. STEREOTYPES AND BACKGROUND

The formation of stereotypes has the power to shift social norms, individual beliefs, attitudes, and actions. These stereotypes emerge not only at a conscious level where people are aware of their beliefs about other groups, but also occur at an unconscious level that impacts one's behaviour (Dasgupta, 2004). Stereotypes are important in the real-world as they have been shown to negatively impact decisions in law enforcement, peace-keeping operations, the courtroom, and even job-hiring in the workplace. For example, there have been multiple studies examining the impact of ethnic stereotypes in simulated threat/law enforcement operations (e.g. Plant, & Peruche, 2005, Correll, Park, Judd, & Wittenbrink, 2002, Correll, Park, Judd, & Wittenbrink, 2007; Plant, Goplen, & Kunstman, 2011). These studies reveal that police officers, college students, and community members alike tend to make more errors mistakenly shooting at unarmed Black American targets than unarmed White American targets. This tendency is often referred to as *shooter bias*. In these studies, participants are shown pictures of Black versus White targets holding either a weapon or a non-weapon and asked to press the 'shoot' button if they were holding a weapons or 'no-shoot' button if they were not holding a weapon. Told to respond as quickly as possible, the purpose is to identify implicit stereotypes that become evident at the early stages of automatic processing. Research has shown that stereotypes are often activated without awareness and probably influence behaviour without the conscious intent or knowledge of the perceiver (e.g., Devine, 1989; Wittenbrink, Judd & Park, 1997). A stereotype specifically refers to "a cognitive schema or a summary impression of a group, in which a person believes that all members of the group share a common trait or traits (positive, negative, neutral)" (Wade & Tavis, 1993, p.654). They are the beliefs about the characteristics and behaviors of members of certain groups. The beliefs act as expectancies which guide the information processing about a group as a whole and individual

group members (Hamilton, Sherman, & Ruvolo, 1990). Myers (1993) suggests that stereotypes can be inaccurate, overgeneralized, and resistant to new information. They are capable of leading us to three distortions of reality. First, they emphasize between-group differences, as opposed to commonalities. Second, they create the impression that all members of groups are the same by underestimating the differences within groups. Finally, stereotypes form selective perception whereby individuals tend to only see what fits the stereotypes, rejecting perceptions that do not fit (Wade & Tarvis, 1993). The implication of the shooter bias research (e.g. Plant, & Peruche, 2005, Correll et al., 2002, Correll et al., 2007) is that individuals involved sincerely believe that their judgments are accurate, not being consciously aware that they are rejecting perceptions that do not fit.

Only one such study has introduced sex (gender) as a potential influence in a perceiver's categorization of threat items. This study, by Plant and colleagues (2011), introduced gender as a moderator to the race studies of detecting threat; specifically, they investigated how the interaction of race and gender influence an individual's split-second decisions (i.e. at the automatic processing stage) regarding use of force. In this study participants underwent two studies using a shoot/no shoot simulation task. The first study examined the effect of gender on biases in decisions to shoot. As in previous studies, participants were told to act as police officers identifying dangerous suspects. On the screen, some suspects would appear with a gun in their hand (suggesting they were armed and dangerous criminals) and the rest of the suspects would appear with neutral objects in their hand, such as a wallet or cell phone (and were therefore not dangerous). As quickly as possible, the participants were required to identify whether each suspect appearing on the screen was a threat or not. All suspects in this study were White males and White females. Instructed to shoot suspects with guns and not shoot suspects with neutral objects by hitting the corresponding key on a keyboard, it was tested whether decisions to shoot were influenced by the gender of the suspect. The results for this study showed that people are biased by the gender of the suspect when responding to threat items, as participants were



more likely to shoot male suspects than female suspects. Furthermore, they biased away from shooting female suspects, and as a consequence were more likely to refrain from shooting armed women than to shoot unarmed men. In study 2 of the research, the interaction of race and gender was tested to see whether participant responses (more likely to shoot unarmed Black male suspects) would generalize to Black female suspects, given that they bias away from perceiving women as threatening. The results revealed that White participants' were influenced by both the gender and the race of the suspects in their decisions to shoot, mistakenly shooting unarmed Black male suspects more often than unarmed Black females and unarmed White males and White female suspects. Being the only study that looks at the influence of gender on decisions involving threat, there is interest to investigate the influence of gender in threat decisions when race is not involved, but when physical attractiveness is manipulated. The current study aims to extend existing research by investigating the impact that stereotypes relating to gender and physical attractiveness have on decision-making in response to threatening versus non-threatening objects. No studies to date have investigated the role that physical attractiveness may play in simulated threat situations, hence the introduction of this new variable to this line of research. Like racism, the broader social implications of decisions involving gender and physical attractiveness may be highly consequential.

To further examine the existing findings of the impact that sex (gender) has on decisions involving threat, and to introduce the potential impact of physical attractiveness, the current research involves an experimental study which has been adapted from previous research designs (e.g., Payne, 2001). A study by Payne (2001) used a priming paradigm to discover the influence of racial cues on a perceivers' identification of weapons. Priming is a type of implicit memory effect whereby exposure to a stimulus influences a person's response to a subsequent stimulus (e.g., Tulving & Schacter, 1990). The experiment involved exposing participants to two pictures that quickly flashed up on a computer screen. They were told not to respond to the first picture (which would always be a face) and instead

respond to the second picture (which would always be a weapon or tool). The second picture would appear 200 milliseconds after the first picture. Participants had to rapidly classify whether the second picture was a gun or a tool. Research on priming has identified that primes that relate to stereotyped groups often elicit quicker responses to negative and stereotypical words (Banaji & Hardin, 1996; Wittenbrink et al., 1997). It is thought that participants may make use of two strategies when they are doing a priming task. There is the adoption of a certainty criterion where they wait until they are confident that their response is correct before they respond. Alternatively, they adopt a speed criterion where, certain or not, the participant responds very quickly. This strategy increases the number of errors made (Draine & Greenwald, 1998). When forced to respond quickly, participants may be caused to make stereotype-consistent errors. In situations where these errors are important such as when law enforcement officers identify weapons, making stereotype-consistent errors could prove to be tragic. In the sections that follow, sex and physical attractiveness will be explained as the two variables of interest in the current study which utilizes a priming paradigm similar to the one used by Payne (2001).

## **1.2. SEX**

An incident in July 2007, where a woman by the name of Hasna Maryi approached an Iraqi check-point, is indicative of the real world implication of misperceiving threat. Hasna fell to the ground when she neared the check-point and cried out to the policemen nearby for assistance. Running to her aid, she detonated a bomb that was strapped to her body, consequentially killing three policemen and injuring 10 civilians (Ghosh, 2008). There are a growing number of female suicide bombers who have been successful because of the perception that females are non-threatening and easily get through security check-points (Speckhard, 2008). This real-life situation is just one example of the devastating consequences caused by police officers mis-perceiving or stereotyping sex. It is cases like these that stimulate the interest for the current research of the implicit role that sex (and physical attractiveness) has on decision-making involving threat.

It is the split-second decisions that define the relationship between automatic and controlled cognition and has made a strong impact on social psychology (e.g., Devine, 1989; Fazio, 1990a; Greenwald & Banaji, 1995; Wilson, Lindsey, & Schooler, 2000). From the example above, there is reasonable cause to expect that gender is likely to influence perceptions and stereotypes of threat and decisions to respond with force. Considerable evidence shows that males are more physically aggressive than females, and commit more violent crimes (e.g. Daly & Wilson, 1994; Eagly & Steffen, 1986; U.S. Federal Bureau of Investigations, 1995-2006). Therefore, the common association of men with violence and aggression may influence people's perceptions to regard men as threatening. In contrast, women are often perceived as weak and vulnerable (Glick & Fiske, 1996), and are therefore more likely to be perceived as virtuous and non-threatening. Men have a duty to protect women and if necessary, with force. This generates the belief that men are often associated with threat or violence more than women. It is evident that gender bias exists regardless of racial stereotypes. For example, White people in the United States apply their stereotype of violence and aggression to Black males more strongly than to Black females (Navarette, McDonald, & Sidanius, 2010; Quillan & Pager, 2001). In addition, it is a common phenomenon that female criminals receive differential treatment, indicative of lower arrest rates and more lenient sentencing (Visher, 1983). On computer simulation games, the implicit association of men with threat and women with innocence is likely to bias people's shooting decisions toward shooting targets that are male and inhibiting from shooting targets that are female.

In the current study, the role that sex has on people's perception of threat is explored in a similar way to previous research. Although adapted from the shooter paradigm and its research, participants will not be shooting at a target, instead they will be presented with a picture of a weapon or non-weapon on the computer screen after a picture of a male or female face flashes on the screen. The task adopts a priming paradigm and requires the participant to identify whether a weapon appeared or a non-weapon appeared and its intention is to see the association that the sex of the person in the picture has

on people's responses to threat identification.

By exploring the effect that gender has on categorization of threat and non-threat items, the present study may contribute to the largely untested questions and assumptions that have arisen in the literature. Gender stereotypes and perceptions of threat are likely to demonstrate base-rate differences in violence propensity. In particular, people including law enforcing personnel may fail to correctly identify threats in the environment when confronted by women like Hasna Maryi. Officers are often at the mercy of heightened danger when female suspects are violent and aggressive because the officers stereotypically are under-prepared for a hostile or aggressive response. People are likely to set a high threshold to identify women as threatening and therefore are more likely to misidentify female threats as opposed to males, and therefore may fail to correctly respond with the necessary force.

### **1.3 PHYSICAL ATTRACTIVENESS**

The effect that physical attractiveness has on people's perceptions of threat is also introduced into the study as a new potential moderator that has not been researched before. Therefore, the pictures used in the current study are not only of males and females but are either physically attractive males, physically attractive females, unattractive males or unattractive females. By introducing the new concept of physical attractiveness in this line of research, it will contribute to the existing literature and assumptions that people's stereotypes can heavily influence decision-making regarding threat. Essentially, it will assist in gaining a better understanding in a broader sense of how people's stereotypes may influence threat item categorization. Below, there are three theories offered as possible explanations for what might be found in the current study. Firstly, a background on physical attractiveness is offered.

#### **1.3.1 Definition of physical attractiveness**

Physical attractiveness is the most visible and easily accessible characteristic of a person (Solomon & Saxe, 1977). It plays a major role in everyday life decision making where individuals are either being judged or judging others. Judgments of people you have met for the first time are largely based on their physical attractiveness because of the instant availability of information. Physical attractiveness is defined as the degree to which one's image elicits favourable reactions from others (Morrow, 1990). Physical attractiveness has often been researched in the literature by asking people to judge the level of attractiveness of a portrait photo of an individual's face (Morrow, 1990), as will be done in Study 1 of the current research. High reliability has been obtained throughout demonstrations of physical attractiveness judgments and is consistent over time and within a given culture (Hatfield & Sprecher, 1986; Umberson & Hughes, 1987). Not only are physical attractiveness ratings demonstrated within cultures, they are also consistent across cultures (Langlois et al., 2000). Similarly, there has been shown to be high levels of consensus between males and females when judging levels of physical attractiveness of a person both within and across cultures (Langlois et al., 2000; Patzer, 1985).

Although males and females share agreement on a person's attractiveness, Anderson and Nida (1978) found that males and females are differentially influenced by physical attractiveness depending on the person's sex. They studied the impact that physical attractiveness had on the evaluation of academic essays, revealing that the essay writer's level of physical attractiveness influenced the evaluations more when the evaluator was the same sex. In addition, according to Abramowitz and O'Grady (1991), female attractiveness is perceived as more important than male attractiveness and there is also a greater impact of attractiveness in society for females than males.

For years, social and behavioral psychologists have studied what makes an individual physically attractive. It is a complex construct that reflects various important factors. Facial attractiveness is a major component to the overall ratings of attractiveness. Facial attributes such as even coloring, smooth, pliant skin, clear eyes and shiny hair are all signs of being healthy (Thornhill & Gangestad

1999), and accordingly dictate physical attractiveness. In regards to the face itself, symmetry, averageness, and masculinity and femininity increase levels of perceived attractiveness (Thornhill & Gangestad, 1999). Attractive individuals are perceived in various judgment and evaluative ways, which concerns stereotyping on the basis of physical appearance. In the current study, physical attractiveness is added as a moderator to see what effect it has on participants' categorization of threat items. One theory offered in the current study is the possibility that physically attractive people will be associated less with weapons than non-weapons because of the "what is beautiful is good" stereotype or halo effect described below.

#### **1.4. WHAT IS BEAUTIFUL IS GOOD/HALO EFFECT THEORY**

Across the psychological literature, the physical attractiveness stereotype is largely known as the "what is beautiful is good" stereotype (Dion, Berscheid & Walster, 1972, p. 285). Its contention lies in the common assumption that individuals who are physically attractive also possess other socially desirable personal qualities. Psychological research by Dermer and Thiel (1975), has demonstrated the attitudes towards physically attractive people are more positive, for example, that people perceive physically attractive people to have more socially pleasing personalities than their unattractive counterparts. Other studies show that physically attractive people are perceived to be happier, more social and more successful (Eagly et al., 1991; Hatfield & Sprecher, 1986, Langlois et al., 2000; Reis et al., 1982; Berscheid & Walster, 1974; Dermer & Thiel, 1975; Dion, Berscheid, & Walster, 1972; Clifford & Walster, 1973). Hatfield and Sprecher (1986, p.21) portrayed that "people believe good-looking people possess almost all the virtues known to humankind". The research that provided the most striking evidence for the "what is beautiful is good" stereotype was carried out by Feingold (1992). Feingold analyzed all prior attractiveness research and found that people who are physically attractive are perceived by others to be more sexually warm, dominant, social, mentally healthy, intelligent and

socially skilled than their physically unattractive counterparts. The existence of an attractiveness stereotype demonstrated throughout psychological research also leads one to rationally suggest the existence of an attractiveness-induced halo effect (Heilman & Stopeck, 1985). Originally conceptualized by US psychologist Edward Thorndike in 1920, the halo effect is the natural tendency to make specific judgments based on an overall impression. It occurs when positive expectations are formed about what a person is like or how they should behave based on stereotypic and implicit beliefs associated with the group that person belong to. The stereotype typically creates a bias of the way they are perceived by other people. Such a bias is believed to be especially strong when objective information about the person is lacking (Stone, Stone & Dipboye, 1992). Individuals are often expected and anticipated to behave and act in ways that conform to the preconceived stereotypic beliefs that are associated with their group. The attractiveness-induced halo effect, like the “what is beautiful is good” stereotype, suggests that people have only a positive perception about physically attractive people.

Attractiveness biases have been demonstrated in areas such as teacher judgments of students (Clifford & Walster, 1973), voter preferences for political candidates (Efrain & Patterson, 1974) and in the context of employment decision-making (Dipboye, Arvey & Terpstra, 1977; Frieze, Olson & Russel, 1991; Marlow, Schneider & Nelson, 1996; Morrow, 1990; Shannon & Stark, 2003; Watkins & Johnston, 2000). For example, physically attractive people were found to be allocated higher starting salaries than unattractive people (Dipboye, Arvey & Terpstra 1997), are more likely to be promoted (Heilman & Stopeck, 1985), receive higher performance appraisals (Heilman & Stopeck, 1985), and are more likely to be hired in the selection process than unattractive candidates (Razar & Carpenter, 1987; Dipoboye, Fromkin & Wiback, 1975). Individual’s physical attractiveness has been shown to influence jurors decisions regarding suggested lengths of imprisonment. De Santis and Kayson (1997) demonstrated that physically attractive defendants were assigned shorter sentences than physically unattractive defendants who committed the same crime. Despite legislation prohibiting employment

discrimination on the basis of gender, race, ethnicity, disability and age, it is interesting that there is no legislation in relation to physical attractiveness (Watkins & Johnston, 2000). On the contrary, there is also evidence that replaces the “what is beautiful is good” theory with the “beauty is beastly” effect, such that attractive females are evaluated less favorably than unattractive females (see Heilman & Saruwatari, 1979).

The current study aims to highlight the potential for stereotyping toward physically unattractive people, which can have dire consequences in such areas as in the criminal justice domain. For example, a physically attractive guilty target may be overlooked because of the officer’s stereotype that “beautiful is good” and therefore erroneously may take down the physically unattractive, yet innocent, bystander.

The bias to treat physically attractive people better is also seen to exist in employment settings (Dipboye, Arvey & Terpstra, 1977; Frieze, Olson & Russell, 1991; Marlowe, Schneider & Nelson, 1996; Morrow, 1990; Shannon & Stark, 2003). Physical attractiveness has high observer agreement across ages, cultures and social norms (Gallup & Frederick, 2010; Langlois et al., 2000). It is a cue that is instant and is evident very early in life, recognizable before other cues such as socially dominant behaviour, musculature, and adornment. Research shows that attractive babies are given better ratings by parents and observers in health, behaviour and measure of intelligence and are given more affection by their mothers (Cash, 1990; Langlois et al., 1995; Stephan & Langlois, 1984). The many studies that show the “beauty is good” effect of physical attractiveness also commonly demonstrate that unattractiveness is related to a pattern of negative behaviors and attitudes from others, forming the suggestion that “ugly is bad” (Dermer & Thiel, 1975, p. 1171; Griffin & Langlois, 2006, p. 187). For example, parents and observers of unattractive babies more likely demonstrate negative attitudes towards them (Langlois et al., 1995; Stephan & Langlois, 1984); unattractive children are often treated less favorably by teachers in preschool, bullied more in teenage year and are more physically abused



(Roscoe, Callahan, & Peterson, 1985; Sweeting & West, 2001). These early in life incidences are worth mentioning because the negative attitudes from caregivers and peer are known to be linked to our perceptions and aggression later in life (e.g. Jaffee et al., 2005; Kotch et al., 2008).

Although extensive research has signified the existence of the halo effect in employment settings, there are shortcomings in regards to whether the "what is beautiful is good" stereotype extends to making decisions in dangerous or threatening situations. Specifically, no studies have looked at the effect that physical attractiveness has on people's decision making in a weapon versus non-weapon primed categorization task. Knowing that identified physical attractiveness biases exist (e.g., De Santis & Kayson, 1997) in other settings, the findings of the current study may suggest similar biases. That is, it may be found that physically attractive primes may be categorized more with non-weapons (non-threatening) than with weapons (threatening).

### **1.5. EVOLUTIONARY THEORY**

An alternative perspective to the "what is beautiful is good" theory involving physically attractive targets comes from the evolutionary perspective. This more strategic perspective suggests that detection is dependent on the sex of the rater. A heterosexual male rater, for example, may refrain from associating a physically attractive female with threat items but may associate a physically attractive male with threat items because he sees attractive males as a threat in terms of mate selection. Comparatively, heterosexual females may associate physically attractive females with threat items. That is, depending on the sex of the participant, they would associate physically attractive targets of the opposite sex with non-weapons, but physically attractive targets of the same sex to weapons because of mate selection induced associations of attractive members of the same sex as potential threats. This is because physical attractiveness is a multifaceted construct that encompasses biological characteristics and behaviour (e.g., Elliot & Niesta, 2008; Etoff et al. 2011; Gangestad et al. 2004), not just facial

adornments. The results from studies show that both artificial and biological cues that represent reproductive fitness are perceived to be more attractive as well as being connected to positive life outcomes such as longevity, fertility, physical strength and even IQ, initiating many to perceive physical attractiveness to be an honest signal of reproductive potential (Gallup & Frederick, 2010). In this way, from a mate selection and a competitive evolutionary perspective, people should see attractive members of the same sex as rivals (threats) but attractive members of the opposite sex as the opposite (opportunities).

### **1.6. AROUSAL THEORY**

A third perspective that is offered in the current study is the effect that arousal has on people's decision-making when physical attractiveness and threat item categorization is involved. The potential role of arousal causing attentional bias has become a promising concept offered by several recent studies (Ben-Zeev et al., 2005; Blascovich et al., 2001; O'Brien & Crandall, 2003). Studies have shown that even something as simple as a picture displayed for a few seconds can increase arousal (e.g., Bradley, Miccoli, Escrig, & Lang, 2008). Arousal is heightened activity of the sympathetic nervous system that energizes behavior (O'Brien & Crandall, 2003). In the current study the potential role of arousal may be a promising theory to examine. Of course, there is a connection between arousal and anxiety. Anxiety is associated positively with adrenal-cortical responses, a characteristic of heightened arousal (Dienstbier, 1989; Folkman & Lazarus, 1986). Given the nature of this study in that it includes physically attractive targets sexual arousal may be a contributing factor alongside anxiety (it has also been found that people who are anxious are thought to bias toward threat-related material (Beck, 1976; Beck & Clark, 1997; Beck, Emery, & Greenberg, 1985; Bower, 1981, 1987)). Arousal caused by physically attractive targets, especially for more visual males, may contribute to the enhancement of categorizing a non-threatening item as threatening as the anxiety and arousal activate similar responses in the sympathetic

nervous system (e.g., increased heart rate, sweating, and release of epinephrine). This is thought to may be more prevalent for men than women because men are often more visually stimulated than women; they are more likely to get physically aroused by static images of the opposite sex. This is also supported by researchers such as Abramowitz and O'Grady (1991) who claim that female attractiveness is perceived more important than male attractiveness and the suggestion that there is also a greater impact of attractiveness in society for females than males. It is possible that distraction of physically attractive targets (especially for male participants), may be associated with the arousal that is commonly associated with anxiety and threat perception biases. Therefore, there is reason to suspect that the arousal caused by the physically attractive target might be confused with the anxiety of the threat associated with the task (a generalized bias towards threat detection). In addition, researchers have shown that arousal and attention closely interact with one another, for example arousal influences attention allocation (Easterbrook, 1959), and more recently Mano (1994) and Lewinsohn and Mano (1993) have shown that arousal reduces attentional capacity and information-processing time. There have been findings that also suggest that sexual arousal affects an individual's judgments and behavior (Loewenstein, Nagin, & Paternoster, 1997), which supports the idea that arousal may affect decision making in threat situations when physical attractiveness is involved.

Because decisions to do with threat are of a split-second nature, arousal (through activation of the sympathetic nervous system) may lead to an increased number of inappropriate responses, such as categorizing a picture of a face primed a weapon when they are in fact paired with a non-weapon. On the other hand, when a task is slower and more controlled, fewer errors are likely to occur because of lower levels of arousal. Given the nature of the present study, the speed at which participants are required to respond combined with the physical attractiveness of the target will potentially cause increased arousal and therefore harm their performance and accuracy. If the arousal theory is supported in the current study it is suspected that it will more likely support the results for male participants than

for female participants. This is because males are more likely to get physically aroused by static images of attractive members of the opposite sex (according to the large respective industry).

In the current study, people's stereotyping tendencies are examined, in particular how gender and physical attractiveness affects people's split-second decisions regarding threat categorisation. Specifically, the research intends to discover whether there is a male and female threat bias, an attractiveness bias and a female target attractiveness bias based on male evaluators' perceptions. Two studies are part of this research.

To determine which photos would be used for the simulation task, a separate study was done to rate sets of photos on their physical attractiveness (Study 1). As part of this separate study, it will be interesting to see if there is any correlation between physical attractiveness and threat, therefore participants will also be required to evaluate the photos based on how threatening they perceive them to be. It is expected that physically attractive photographs will be negatively correlated to threat.

Adapted from the 'shooter paradigm' and Payne's (2001) study, participants will be asked to categorise weapons from non-weapons on a computer simulation game after a picture of a physically attractive or physically unattractive male or female prime appears for a split-second on the screen (200ms) (Study 2). The pictures of the males and females used in the threat detection task will be selected from participant ratings of photos on physical attractiveness from Study 1. It is expected that the study will support one of the theories offered above – “what is beautiful is good” or halo effect theory, the evolutionary theory, or the arousal theory. Given the time and length limitations of the current study, the focus has been primarily dedicated to look at participant errors of categorizing a non-weapon as a weapon; detecting threat when there is no threat and under what circumstances this may occur.

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## SECTION II – STUDY 1

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### *Ratings of physical attractiveness and threat and the relationship between the two*

#### **2.1. INTRODUCTION**

For this study, pictures were rated for physical attractiveness and threat. The goals of this study are to enable selection of pictures for Study 2 based on rated attractiveness and to enable the assessment of the relationships between participant's perception of attractiveness and perception of threat for men and women.

#### **2.2. METHOD**

##### **2.2.1. Participants**

Forty four people (18 males and 26 females) rated a data set of photos on their physical attractiveness, 11 participants (4 males and 7 females) rated five additional photos on their physical attractiveness. Twelve participants (2 males and 10 females) rated these combined 82 photos on threat.

##### **2.2.2. Materials**

A data set of 77 photos of faces was acquired from previous research in the field. These photos were natural-looking with a grey background. The photos had not been manipulated at all and all had natural lighting. An additional 5 photos were chosen from the internet that were perceived to be highly attractive. Whilst these photos were chosen on attractiveness, at the same time it was made sure they looked as natural as possible. The backgrounds of these photos were changed to grey to match the original photo set as much as possible.

### **2.2.3. Procedure**

Using Qualtrics Online Survey Software, a first survey was submitted to rate the attractiveness of the photos in the original data set. Participants were required to rate the seventy seven photos on a Likert scale. The question for each picture was ‘On a scale of 1 to 10, 1 being very unattractive and 10 being very attractive, please rate the following pictures’. Because the pictures were on average at the lower end of the physical attractiveness scale, an additional 5 photos were extracted from the internet that were perceived to exhibit a higher level physically attractiveness. These photos were put into a separate survey of which participants were required to answer the same question. Eleven different people answered this survey.

The pictures of both surveys were put together to generate a third survey where participants were to answer the question, ‘On a scale of 1 to 10, 1 being very non-threatening and 10 being very threatening, please rate the following pictures’. Thirteen people participated in this survey. This was to discover how threatening people perceived the photos to be and to ascertain whether there is any correlation between physical attractiveness ratings and threat ratings.

To determine which photos would be used for the computer simulation game, the averages of the attractiveness ratings would be used.

## **2.3. RESULTS**

The means and standard deviations were calculated for physical attractiveness ratings and threat ratings. Table A1 in Appendix A shows the means and standard deviations of physical attractiveness for the original data set used as well as the additional five photos added. Table A2 in Appendix A shows the means and standard deviations of all of the photos combined for threat.

To see if there was any relationship between the ratings of physical attractiveness and ratings of

threat, correlations based on the mean rating of attractiveness and threat for each photograph were calculated. When both male and female photographs ( $N = 82$ ) were analyzed together there was a significant negative correlation between physical attractiveness and threat ( $r = -.311, p = .004$ ), as physical attractiveness increased the perception of threat decreased. When only female photographs ( $N = 48$ ) were examined the relationship between attractiveness and threat was non-significant, ( $r = -.064, p = .665$ ). In the case of male photographs ( $N = 34$ ) the relationship was however significant ( $r = -.491, p = .003$ ). Overall, male photographs were rated as more threatening ( $M = 3.19, SD = .85$ ) than were female photographs ( $M = 2.66, SD = .59$ ),  $t(80) = 3.318, p = .001$ , but for attractiveness, male ( $M = 4.38, SD = 1.49$ ) and female ( $M = 4.66, SD = 1.26$ ) photographs were not significantly different,  $t(80) = .928, p = .356$ .

The 16 photos used for the computer simulation task (Study 2) were selected by using the four highest mean ratings for women (physically attractive), four lowest mean ratings for women (physically unattractive), the four highest mean ratings for males (physically attractive) and the four lowest mean ratings for males (physically unattractive). The means of these photos are shown in Table 1 below.

**Table 1.** The means and standard deviations of the physical attractiveness (PA) and threat for the photos selected for the computer simulation task (Study 2).

Photo	Photo #	PA Mean	SD	Threat Mean	SD
Physically Attractive Females	13	5.386364	1.741637	3.25	1.864744682
	12	6.409091	1.632777	2.75	1.356801051
	78	7.545455	0.8202	2.363636364	1.858640755
	80	9.454545	0.522233	2.916666667	2.353269808
Physically Attractive Males	27	6.348837	2.010493	2.818181818	1.250454463
	79	7.818182	0.873863	3.416666667	2.252271581
	82	8	1	2.833333333	2.124888589
	81	8.818182	1.401298	1.916666667	2.020725942
Physically Unattractive Females	61	2.744186	1.310998	4.416666667	2.314316445
	45	2.767442	1.3945	2.636363636	1.501514387
	62	3.119048	1.626044	3.416666667	1.56427929
	19	3.295455	1.51856	3.75	2.378884383
Physically Unattractive Males	71	2.744186	1.481521	4.083333333	2.234373344
	43	2.930233	1.549122	5.083333333	2.539088359
	30	3.046512	1.542316	3.583333333	1.676486224
	70	3.232558	1.509292	2.75	1.95982374

For the 16 pictures used in the Study 2, 2 (attractive vs. unattractive) x 2 (male vs. female) ANOVAs were conducted for both attractiveness and threat ratings. Attractive photos ( $M = 7.47$ ) were, as expected, significantly more attractive than unattractive photos ( $M = 2.99$ ),  $F(1, 12) = 76.51$ ,  $p < .001$ ,  $\eta_p^2 = 0.864$ . Neither sex nor the interaction of sex and attractiveness were, however, significant,  $p > .05$ . In the case of threat, attractive photos ( $M = 2.78$ ) were significantly less threatening than unattractive photos ( $M = 3.72$ ),  $F(1, 12) = 6.88$ ,  $p = 0.022$ ,  $\eta_p^2 = 0.364$ . Neither sex nor the interaction



of sex and attractiveness were, however, significant,  $p < .05$ .

#### **2.4. SUMMARY**

The means and standard deviation for each rated photo was determined as part of Study 1. It is interesting to note that the relationship between physical attractiveness and threat was negatively correlated. This means that as the ratings for physical attractiveness increased, the perceived level of threat decreased. This appeared to largely be driven by male photographs. Males were generally rated as more threatening than females. However, for male targets there is also evidence of a halo effect as more attractive males tend to be perceived as less threatening than physically unattractive males. For the computer simulation game, the least physically attractive and most physically attractive pictures between the two genders were selected. There were 16 photos in total selected. That is, the four highest average rated females, the four highest rated males, the four lowest average rated females and the four lowest average rated males were extracted from the data sets for the computer simulation task (Study 2). The physically attractive photos selected for Study 2 were also rated significantly less threatening than the physically unattractive photos used for Study 2. This supports the claim that physically unattractive people are perceived to be generally more threatening than physically attractive people, supporting the “what is beautiful is good”, or halo effect theory. The question, however, remains whether physical attractiveness, as an indicator of threat, influences a person’s susceptibility to perceive a non-threatening item as a threat.

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## SECTION III – STUDY 2

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### *Does physical attractiveness and sex impact decisions in a threat detection task?*

#### **3.1. INTRODUCTION**

Stereotypes become evident when decision-making is of a split-second nature. To discover whether there is any influence of physical attractiveness and sex in response to threat, a computer simulation game was designed to essentially capture participant biases or stereotypes. Participants will be required to categorise weapons from non-weapons after the exposure of a physically attractive female, physically attractive male, physically unattractive female or a physically unattractive male. These pictures were obtained from Study 1. The task requires a quick response as exposure of each picture is short. The task looks at the errors that the participants make, such as incorrectly categorizing a picture as a weapon – essentially a participant’s inclination to perceive a non-threatening item as a threat. It is expected that the results will show support for either the “what is beautiful is good” or halo effect theory, the evolutionary theory, or the arousal theory.

#### **3.2. DESIGN & ANALYSIS**

The study employed a 2 (sex of target: male or female) by 2 (photo physical attractiveness: attractive/unattractive) by 2 (sex of participant: male/female) by 2 (object: weapon/non weapon) mixed analysis of variance.

#### **3.3. PARTICIPANTS**

One hundred and ten students from University of Canterbury participated in this study, in return for a

\$10 petrol voucher or 2 course credits if they were from the 100 level Psychology Pool. All of the participants had normal or corrected-to-normal vision. There were 66 females and 44 males (110 participants is perceived to be good sample size as Payne (2001) only used 31). The mean age was 22.5 years and ranged from 17 to 53 years. 16 participants reported to be left handed, 87 participants reported to be right handed, and 7 participants provided no answer to this question. English was the first language for 86 of the participants. All of the participants were heterosexual.

### **3.4. MATERIALS**

#### **3.4.1 Information Sheet**

An Information Sheet was given to all participants (see Appendix B). This sheet indicated that the aim of the study was to examine perception of threat – to categorize pictures on how threatening they seem. The information sheet did not reveal what the study aimed, that is, it was not revealed that the study aimed to examine how physical attractiveness and sex affects people's perceptions of threat. The participants saw the study as having a worthwhile purpose but were not pre-primed as to the exact nature of the study which may have influenced their responses. The information sheet outlines the task required of the participants as well as indicating the estimated time of completion of the task. Measures put in place to assure participant responses remained anonymous and confidential were also explained. It also outlined that participants had the option of receiving feedback by contacting the researcher via the details provided on the sheet. The information sheet gave participants the option to withdraw from participation at any time throughout the study including the withdrawal of any information they provided.

All participants were allocated a number of which they entered into the computer prior to the experiment; this was to track individual results.

### 3.4.2 Demographics Questionnaire

All participants were required to complete a demographics questionnaire prior to the task (see Appendix C). This questions covered their sex, age, ethnicity, sexual orientation, gaming ability, handedness and if they were a female - at what stage they were in their menstrual cycle (of which was later not used in the study).

### 3.4.4 Debriefing Sheet

All participants were provided with a Debriefing Sheet (see Appendix E), which informed that the actual title of the project they had participated in was “*Does Physical Attractiveness and Sex Impact Decisions in a Threat Detection Task?*” The Debriefing Sheet informed participants that the purpose of the study was to investigate the effect that physical attractiveness and sex had on who is selected as threatening versus harmless. The Debriefing sheet also informed participants as to why they were not told of the actual purpose and title prior to their participation as it may have affected their responses. The Debriefing Sheet also explained why they were asked to identify, if they were female, what phase of their menstrual cycle they were at – so we could account for any effects of menstrual phases on females weapon and non-weapon categorization, especially when physical attractiveness was involved (N.B – this was later decided not to be utilized in the current study). Predictions of the study were also outlined in this sheet. The Debriefing Sheet also included an email address so that any concerns, queries, or feedback could be addressed.

## 3.5 PROCEDURE

To test the effect that physical attractiveness and sex have on people’s perception of threat, we designed

a computer simulation game with computer software E-Prime to assess people's split-second decisions when faced with weapons and non-weapons.

Participants were seated at a computer in a lab at the Psychology department of the University of Canterbury. The researcher informed participants that the aim of the first study was to examine threat detection.

Participants first reviewed the information sheet and after signing the consent form, they completed a demographics questionnaire. As the information sheet instructed, they were informed that the task tested speed and accuracy and were told that pairs of pictures would be flashed briefly on the computer screen. Participants were instructed not to do anything with the first picture, which would always be a face. It was explained that the appearance of a face would indicate that the second picture was about to be presented. Participants were instructed to respond to the second picture, which would always be a weapon (gun or knife) or a non-weapon (cell phone or camera). Their task was to classify each picture as either a weapon (gun or knife) or non-weapon (cell-phone or camera) by pressing one of two keys on a key board; stickers with “weapon” or “non-weapon” were placed on the relevant keys as well as on the computer screen to remind them of which keys to press. Participants were instructed to respond as quickly and accurately as they could, and not to worry if they were to make a mistake. Prior to the active trials, participants were given 48 practice trials to become accustomed with the targets and classifying them quickly. No primes (facial pictures) appeared during the practice trials; the task was simply to familiarize the participants with the target objects and classify them using a key press.

When the critical trials began, participants were exposed to pairs of pictures. The first picture (the prime) was always an unattractive male, an unattractive female, an attractive male or an unattractive female. The second picture was always a gun, a knife, a cell phone, or a camera. The prime was presented on the screen for 200ms, followed immediately by the target for 200 ms. The stimulus

onset asynchrony (SOA) was 200 ms. For each trial, participants were allowed 500 ms to respond after the onset of the target. The length of exposure was based on previous research (e.g., Payne, 2001). If the participants failed to respond within the time limit, a large red X would appear on the screen before commencement of the next trial. Participants completed a total of 192 critical trials. The prime-target pairs were determined by the computer program, presented in a random order.

After the experiment, participants were thoroughly debriefed of the true objective of each task they were required to complete. Those who were partaking in the experiment for course credit were required to fill out a questionnaire about the purposes of the study and those who partook for a voucher were given either a Westfield or petrol voucher. Participants were then thanked and dismissed.

### **3.6. RESULTS**

#### **3.6.1. ANOVA/Proportion of errors**

For each participant, the proportion of incorrect trials were calculated by dividing the number of incorrect trials by the number of correct plus incorrect trials (i.e. the proportion of incorrect trials over the total number of trials) for each of the 8 conditions (object x attractiveness x target sex). Bigger numbers imply more errors. The error proportion were analysed with a 2 (male participant vs. female participant) by 2 (attractive vs. unattractive) by 2 (weapons vs. non-weapon) by 2 (male target vs. female target) mixed analysis of variance (ANOVA). There was a main effect for target sex with more errors for female targets ( $M = .193$ ) than male targets ( $M = .178$ ),  $F(1, 108) = 5.86$ ,  $p = .017$ ,  $\eta_p^2 = .051$ . There was also a significant three way interaction between participant sex by target sex by weapon,  $F(1,108) = 6.246$ ,  $p = .014$ ,  $\eta_p^2 = .055$  and there was a significant four way interaction of gender, attractiveness, object and sex was significant,  $F(1,108) = 3.919$ ,  $p=0.05$ ,  $\eta_p^2 = .035$ . The means for the three way interaction are presented in Table 2 and the means for the four way interaction are presented in Table 3.

**Table 2.** The means for the three-way interaction between sex of participant, sex of target and object.

Sex	Sex of Participant	Weapon	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Male	Female	Weapon	.212	.024	.164	.260
		Non-Weapon	.182	.020	.142	.222
	Male	Weapon	.183	.024	.134	.231
		Non-Weapon	.180	.019	.142	.218
Female	Female	Weapon	.184	.020	.145	.223
		Non-Weapon	.195	.016	.162	.227
	Male	Weapon	.183	.020	.143	.223
		Non-Weapon	.165	.016	.134	.196

**Table 3.** The means for the four-way interaction between sex of participant, physical attractiveness, sex of target and object.

Sex of Participant	Attractive-ness	Sex of target	Weapon	Mean	Std. Error	95% Confidence Interval	
						Lower Bound	Upper Bound
Male	Physically Attractive	Female	Weapon	.221	.025	.172	.270
			Non-Weapon	.173	.023	.128	.219
		Male	Weapon	.180	.026	.129	.231
			Non-Weapon	.180	.021	.139	.221
	Physically Unattractive	Female	Weapon	.203	.026	.151	.255
			Non-Weapon	.190	.021	.149	.232
		Male	Weapon	.185	.026	.134	.237
			Non-Weapon	.180	.021	.139	.221
Female	Physically Attractive	Female	Weapon	.181	.020	.141	.221
			Non-Weapon	.203	.019	.166	.240
		Male	Weapon	.196	.021	.155	.238
			Non-Weapon	.166	.017	.132	.200
	Physically Unattractive	Female	Weapon	.186	.021	.144	.229
			Non-Weapon	.186	.017	.152	.220
		Male	Weapon	.170	.021	.128	.212
			Non-Weapon	.164	.017	.130	.198

To further investigate these complex interactions, the error proportions were separately analysed for weapons and non-weapons using 2 (participant sex) x 2 (target sex) x 2 (target attractiveness)



mixed ANOVAs. For weapons, there were no significant effects or interactions (all  $ps > .05$ ). For non-weapons there was a trend for target sex, an interaction between target and participant sex, and a three way interaction of attractiveness, target sex and participant sex,  $F(1,108) = 3.384$ ,  $p = 0.69$ ,  $\eta_p^2 = 0.30$ . To further explore these later trends, the error portions for each of the target sexes were analysed with two 2 (participant sex) by 2 (target attractiveness) mixed ANOVAs. For target males  $F(1,43) = 4.384$ ,  $p = 0.42$ ,  $\eta_p^2 = 0.093$ .

### 3.6.2. T-Test

There was a non-significant difference when males categorise after primed by unattractive males (UMNW  $M = 0.20$ ,  $SD = 0.22$ ) and unattractive females (UFNW  $M = 0.21$ ,  $SD = 0.22$ ). There was a significant difference in proportion of errors  $t(43)$ , for attractive females with non-weapons  $M = 0.18$ ,  $SD = 0.14$  and for attractive males with non-weapons AMNW  $M = 0.20$ ,  $SD = 0.16$ ;  $t(65) = -1.02$ ,  $p = 0.31$ ). There was no significant difference when females rate unattractive males (UMNW  $M = 0.17$ ,  $SD = 0.14$ ) and unattractive females (UFNW  $M = 0.19$ ,  $SD = 0.14$ ). There was a non-significant difference in proportion of errors,  $t(65) = 1.29$ ,  $p = 0.20$ ).

Alternatively if the analysis is conducted by separating participant sexes and conducting two 2 (target sex) by 2 (target attractiveness) repeated measure ANOVAs, then there is a significant main effect of target sex for male participants with target females ( $M = .212$ ) resulting in more errors than target males ( $M = .183$ ),  $F(1,43) = 4.384$ ,  $p = .042$ ,  $\eta_p^2 = .093$ , but no significant results or trends for female participants,  $p > .10$ .

### 3.7. SUMMARY

The findings of Study 2 indicate that males make more non-weapon errors when the target is female.

This is particularly the case when the target is an attractive female. There is no significant effect when males rate targets that are physically unattractive, male or female. There is also no significant effect when females rate males or females, attractive or not. Although there were no significant effects for erroneously detecting weapons, a sex trend showed that there were more errors with target females than target males.

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## SECTION IV – DISCUSSION

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### 4.1. FINDINGS

The aim of the current study was to investigate whether sex and physical attractiveness of face primes had an effect on categorizing weapons from non-weapons. The study was an adaptation of the ‘shooter paradigm’ and was specifically modeled from a study by Payne (2001). Essentially, it aimed to assess people’s susceptibility to perceive a non-threatening item as a threat. In the main study participants categorized a set of picture stimuli as weapons or non-weapons that were primed with pictures of unattractive and attractive males and females.

Study 1 involved having people rate a set of faces to ascertain how physically attractive they perceived them to be. In addition, people also rated the photos to show how threatening they perceived them to be. Correlations between the faces ratings of physical attractiveness and threat were investigated. In Study 1 there was a significant negative correlation between physical attractiveness and threat. That is, when the rating of physical attractiveness increased the rating of threat tended to decrease. This appeared to be particularly the case for photographs of men. In addition, photographs of men were overall rated more threatening than photographs of women regardless of attractiveness. There was no overall significant difference between the ratings of men and women for physical attractiveness.

From the larger set of photographs used in Study 1, a smaller set of 16 photographs of the highest and lowest men and women photographs rated for attractiveness were chosen for use in Study 2. Amongst these photographs, there was a significant difference between those high and low in physi-

cal attractiveness for threat ratings. That is, photos that were used for Study 2, both male and females, showed a significant difference between the physically attractive photos and unattractive photos for threat. The more attractive photographs used in Study 2, regardless of sex, were rated as less threatening.

In Study 2 male participants were more likely to make a commission error (erroneously categorize a non-weapon as a weapon) when the item followed a woman photograph prime and this appeared to particularly be the case when the woman was attractive. There was no significant effect, however, for women categorizing weapons and non-weapons. This finding shows that women did not appear to misclassify non-weapons as weapons when these stimuli were primed by photographs of men, regardless of whether the men primes were unattractive or attractive. Therefore, physically unattractive photographs were not associated strongly with threatening items.

Study 1's results did support the 'what is beautiful is good' theory (Dion, Berscheid, & Walster, 1972), or halo effect - that people who are physically attractive possess only desirable traits and therefore are not associated with negatively perceived concepts such as threat. The evidence of this adds a new dimension to existing psychological research about stereotypes about physical attractiveness as it suggests that physically attractive people are perceived to be less threatening than physically unattractive people. It was found that as a person's physical attractiveness increases their association to threat decreases. The findings suggest that behaviors and attitudes that people habitually have about unattractiveness that form an "ugly is bad" impression (Dermer & Thiel, 1975; Griffin & Langlois, 2006) also may suggest that they are correlated with the same concept that give us the impression that threat is bad. But this finding was only evident for males, perhaps because women are generally perceived as less threatening. This may have been specific to the photographs sampled, however.

The findings of Study 2 support the proposed theory of arousal. Specifically, it supports the contention that arousal plays an important role in categorization of potential threatening stimuli. For instance, research suggests that arousal enhances performance on easy tasks but harms performance of difficult tasks (Zajonc, 1995), such as Study 2. The adoption of a possible speed criterion in combination with attentional distractions (physical attractiveness) in the task, leads to the reasonable conclusion that arousal plays a role in the findings of the study. When heterosexual males saw the females that were physically attractive, they may have experienced some arousal. The arousal from the visual stimulation distracted them and therefore affected their accuracy to judge the non-weapon stimuli (consistent with Ben-Zeev et al., 2005; Blascovich, Spencer, Quinn, & Steele, 2001; O'Brien & Crandall, 2003). Why, however, was this misclassification only elevated for non-weapons? Males may have erroneously associated physically attractive females more with weapons than non-weapons. This was not the case for female participants in regards to classification occurring after physically attractive male primes. An explanation for this is, as Abramowitz and O'Grady (1991) suggest, that males are more affected by visual stimuli and that female attractiveness is perceived more important than male attractiveness. The attractive men and women used in Study 2 were non-threatening (from Study 1) compared to the unattractive men and women, yet for men (who get more aroused by photos of the opposite sex) they made more misclassifications for non-weapons. Why does this happen? It cannot be a threat association between the prime and the target because the primes are in of themselves non-threatening.

Heightened arousal has been found in previous studies to lead to pessimistic biases when classifying ambiguous stimuli, especially when threat is involved (e.g., Matthews, McIntosh, & Fulcher, 1997, LeDoux, 1995; Ohman, 1993, Bar-Haim et al., 2007). A possible explanation for the current findings is that the arousal of the threat itself combined with pictures of the opposite sex (female) caused heightened arousal evident by the men erroneously categorizing women with weapons.

People who are anxious are thought to be biased toward threat and as a result of this threat-related material is known to be favored (e.g., Beck, 1976; Beck & Clark, 1997; Beck, Emery, & Greenberg, 1985; Bower, 1981, 1987). Some authors suggest that some people are abnormally sensitive to threat-related stimuli and that they are likely be biased towards any threatening information during the automatic stages of processing information (Williams et al., 1988 LeDoux, 1995, 1996; Ohman, 1993). This would lead them to adopt a hyper-vigilant and inaccurate mode toward threat. In contrast, those participants who were not anxious may have been more accurate in categorizing non-weapons as they are not a hyper-vigilant towards threatening objects.

Of course, along with other stereotype researchers, it is important to raise the issue about whether participants are consciously aware of the purpose of the study or the existing negative stereotypes about gender and physical attractiveness. However, due to the speed at which the current study was conducted, an arousal-based explanation for participant behavior is justified because participants most likely adopted a speed criterion; the speed at which pictures of faces were exposed would suggest that the stereotypes have been primed without full conscious elaboration.

The two studies provide little support for the evolutionary psychology perspective presented in the introduction. From this perspective, heterosexual participants would associate physically attractive targets of the opposite sex with non-weapons, but physically attractive targets of the same sex to be a potential threat because of mate selection. Participants would associate sexual competitors with weapons and physical threats; this would be particularly the case for male participants where amongst mammals at least, intra-sexual competition is intense and often violent. The findings would fit with an alternative evolutionary based perspective in which men become primed to look for threats when viewing members of the opposite sex and in particular, when viewing attractive members of the opposite sex. Essentially when viewing a potential mate, men may scan the environment for threats (usually other male competitors), and in Study 2 this may have meant a weapon perception bias (as humans typical-

ly rely on weapons in combat). While evolutionary theory is often criticized in psychology for post-hoc explanations, this possibility is not entirely implausible and warrants further investigation.

## **4.2. IMPLICATIONS**

The results of the current study have a number of practical implications. From Study 1, where there is evidence of a halo effect, more attractive photos were rated as less threatening. Police officers, for example, when they see an attractive woman, may mistakenly disregard her as non-threatening. These stereotypes may intentionally be used by criminals to their benefit, for example, like the case of Hasna Maryi in 2007, who was used as a suicide bomber. Criminals may intentionally select a female to engage in crimes because they know that policemen (or peacekeepers) will not expect a woman to be associated with criminal/threatening activity. Consequences of such scheming could be deadly.

The confirmation of the existence of a gender stereotype in Study 1, as Payne (2001) found in their study, suggests the serious implication of mistakenly identifying females as innocent in the criminal justice domain. For example, the research gives further credence to why females are treated better in regards to criminal justice, for example, lenient sentencing (De Santis & Kayson, 1997).

Because the bias caused by race and physical attractiveness is largely automatic and of a split-second nature, it may be difficult to control directly. This is especially the case when cognitive resources are limited. Several conclusions can be drawn about the automatic and controlled processes involved in a situation where a male police officer is confronted with a female, especially a physically attractive female. If the officer is like the average participant in the current study, he (in this case it will be male) will experience some degree of automatic bias when interacting with a female suspect (as the findings suggest). That is, the male police officer will be more prone to respond as if a physically at-

tractive female is armed or if an attractive female is present, they may generalize this arousal to other ambivalent situations. In situations where a female (especially physically attractive) is actually armed, this bias will facilitate performance. The officer will be faster to respond, as well as less likely to make an error, compared to a situation where a male is armed. However, in situations where a female (especially a physically attractive one) is unarmed and the male policeman responds to his automatic bias, then the consequences may be tragic. The automatic bias exerted by our prototypic male police officer may only be a danger if that officer fails to intentionally control the outcome. As the findings of the study suggest, it is possible that arousal, (which include visual discrimination and attentional distraction) may interfere with the outcome. In the case of a women police officer, in contrast, the findings would suggest that there would be no automatic bias involved in the decisions they make and therefore, they would accurately interact with an armed or unarmed suspect, regardless of whether they are male or female, physically attractive or physically unattractive. However, applying these findings to police officers in real situations with armed suspects may reveal different outcomes. But the hope is that they will be as accurate as these findings suggest, and whether or not males are as inaccurate with females (especially those who are physically attractive) may be the focus of further research.

In contrast to other studies that have looked at gender in respect to decisions involving categorizing threatening items, specifically Plant and colleagues (2011), the findings of the current study do not match this previous work. However, in Plant et al.'s (2011) study race and gender were evaluated together whereas in the present study we cannot compare the findings of gender to race. They found that women are perceived to be less threatening and are less likely to be shot at, whereas the current study found that women are more likely to be misclassified when primed with non-weapons. The most likely cause for this is not that men find women threatening but that they get aroused and this causes them to have a negative bias. However, the designs of the two studies are different and it would take further experiment to compare and make generalizations about these contradicting stereotypes.



### 4.3. LIMITATIONS

The current study had a number of limitations that are important to address.

Firstly was the use of participants who rated the sets of photos. The same participants who rated the first set of photos on attractiveness should have rated the second set of more attractive photos. It would also have been beneficial to have had an equal number of males and females rate the photos so as not to create rating biases based on gender. It would also have been beneficial to have the same number of people rate the threat survey as the physical attractiveness survey. A further limitation was the use of students as the only participants. Students were used because of their availability and motivation to participate in the study. It would be important to investigate whether similar biases exist among those who are required to make real life and death decisions (e.g., police officers and military personnel).

Another limitation to the study was the use of simulation. Certainly, the students used in the current study were not operating under the same conditions as professionals. Decisions made by the participants used in the study had no personal or detrimental consequence or significance, whereas in a real-life threatening situation the decisions are more important and levels of arousal may be greater due to higher levels of anxiety. There is no consequence for the participant when they select a weapon instead of a non-weapon or vice versa; the penalty for a wrong decision was minimal and there was no accountability involved, for example, to a superior. Therefore, it is noted that caution be taken when generalizing the findings to professional or real-life settings. Based on this limitation that there were no personal consequences involved, they may have loosely made their decision and not cared so much as a policeman would in a real-life setting. It would have been very difficult to include any sort of consequence for the participant. However, asking participants to make their decisions as accurately as possi-

ble may have helped. It can be argued that simulation studies are constrained and artificial and so results cannot be generalized to real life, but it could also be argued that simulation studies also contribute and advance our understanding of human behavior and in relation to the current study understanding of the basis of which threat decisions are made. This is because using controlled simulation studies, researchers can vary aspects of the study in order to discover how those things, separately or together, affect behavior. Also, simulation studies allow researchers to test ideas that have been brought up in the real world and then apply the principles and findings back to the real world to assist in making improvements. In the present study, stereotypic cues were definitely present and the use of controlling the timing of one's response was an advantage for significant error rates. Unfortunately, these conditions may not be present when police officers are confronted with a stereotyped suspect.

#### **4.4 RECOMMENDATIONS & FUTURE DIRECTIONS**

The current study aimed to build on previous research on the shooter paradigm by examining the effect that gender and physical attractiveness have on people's perception of threat. Subsequent studies should try to overcome the limitations identified in the current study. Due to the limited amount of research examining the effect of sex and physical attractiveness on people's perception of threat, further research is needed within this area to increase its generalizability and application to other settings.

Future research should also involve the investigation of not only the errors with non-weapons but the errors of omission and errors of commission for weapons and non-weapons.

It is suggested that future research specifically follows up on the idea that men who are sexually aroused have a threat perception bias. Essentially, when men they are aroused they looking for threats. It would be interesting to examine the behavioral and physiological responses to the pictures of physi-

cally attractive targets in comparison to physically unattractive targets. It would be interesting to investigate the varying levels of valence and level of arousal when the participants are exposed to the pictures. Experience of pleasure or displeasure, facial expressions, the startle probe, and heart rate are some indicators that can vary with the level of valence. In contrast, voluntary exposure, interest ratings, skin conductance, the rate of initial heart rate deceleration after picture onset and occipital cortex activation in functional magnetic resonance imaging scans will allow further investigation into the effect that arousal has on the task.

Future studies may attempt to follow the shooter paradigm studies more closely by having the physically attractive or physically unattractive male or female holding the weapon or non-weapon in on picture, instead of priming the participants with the face before the object. This might give a more accurate measure of how threatening they perceive the target to be. Varying the environments that the targets are in may also allow for larger or other effects to be identified, effects that may more closely represent real-life situations. It would also be interesting to repeat the study with pictures that either exacerbate or remediate these gender and physical attractiveness biases. For example, it may be valuable to use pictures of more extreme physically attractive and physically unattractive pictures and to see how changing these extremities interact to produce changes in behavioral performance. The relationship between automatic biases caused by gender and physical attractiveness cues and the subjective conscious states in which perceivers sincerely believe their judgments are accurate and have every intention to behave consistently remains fertile ground for social cognition research.

#### **4.5. CONCLUSION**

The current research involved two studies. In Study 1 a set of faces were rated on physical attractiveness, and also on threat. The results of this study showed that as physical attractiveness increases, perceptions of threat decrease, showing support for the “what is beautiful is good” or halo effect theory.

Study 2 involved an experimental study which was designed to investigate whether target gender and target physical attractiveness had any effect on a perceivers' detection of threat. The results showed that when detecting threat, male participants are more likely to erroneously categorize women with weapons, and this is especially the case when the female target is physically attractive. This presents the possibility of the theory that males get aroused and somewhat distracted by a female when they are physically attractive and therefore the distraction make them erroneously categorize them (that is, perceive them to be holding a weapon when they are not). There was no evidence of females rating males as more threatening than females, regardless of attractiveness.

The purpose of this research was to show the effect that physical attractiveness and gender can have on a perceiver's decisions regarding threat. Specifically, it was intended to add to previous research conducted on biases and the ramifications of these biases when exposed to a threatening situation.

Whilst there were several limitations of the current study, future recommendations have been offered to potentially overcome these. The findings suggest that there is some bias around both sex and physical attractiveness in decision-making involving threat. It is hoped that this study will contribute to the interest in extending this research necessary for a more complete understanding of the role that gender and physical attractiveness play in decisions that involve threat.

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## APPENDICES

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- A. Table A1 and Table A2**
- B. Information Sheet**
- C. Questionnaire**
- D. Debriefing Sheet**

## APPENDIX A

**Table A1.** The means and standard deviations for each photo rated on physical attractiveness.

Photo	PA Mean	SD	Sex of Photo
<b>1</b>	4.727273	1.452562	F
<b>2</b>	3.431818	1.301122	F
<b>3</b>	4.454545	1.758098	F
<b>4</b>	4.522727	1.355242	F
<b>5</b>	4.045455	1.380168	F
<b>6</b>	4.318182	1.62499	F
<b>7</b>	4.704545	1.57863	F
<b>8</b>	2.681818	1.459097	F
<b>9</b>	5.162791	1.429789	F
<b>10</b>	5.931818	1.662133	F
<b>11</b>	3.931818	1.515773	F
<b>12</b>	6.409091	1.632777	F
<b>13</b>	5.386364	1.741637	F
<b>14</b>	3.840909	1.429639	F
<b>15</b>	4.681818	1.852374	F
<b>16</b>	3.295455	1.487616	F
<b>17</b>	3.727273	1.730219	F
<b>18</b>	6.325581	1.643471	F
<b>19</b>	3.295455	1.51856	F
<b>20</b>	3.045455	1.554507	F
<b>21</b>	4	1.732051	M
<b>22</b>	5.232558	1.912829	M
<b>23</b>	3.372093	1.512224	M
<b>24</b>	4.255814	2.01297	M
<b>25</b>	3.744186	1.544468	M
<b>26</b>	4.255814	1.705635	M
<b>27</b>	6.348837	2.010493	M
<b>28</b>	5.804878	2.059087	M
<b>29</b>	4.818182	1.991525	F

<b>30</b>	3.046512	1.542316	M
<b>31</b>	4.454545	1.676854	F
<b>32</b>	4.977273	1.620919	F
<b>33</b>	4.113636	1.714723	F
<b>34</b>	6.25	1.630024	F
<b>35</b>	6.272727	1.590139	F
<b>36</b>	5.318182	1.610615	F
<b>37</b>	3.545455	1.561969	F
<b>38</b>	4.613636	2.115457	F
<b>39</b>	4.909091	1.902485	F
<b>40</b>	3.023256	1.503779	M
<b>41</b>	4.023256	1.9939	M
<b>42</b>	3.325581	1.569363	M
<b>43</b>	2.930233	1.549122	M
<b>44</b>	3.72093	1.790525	M
<b>45</b>	2.767442	1.3945	F
<b>46</b>	4.325581	2.020383	M
<b>47</b>	5.571429	2.0499	M
<b>48</b>	5.139535	1.807147	M
<b>49</b>	4.095238	1.461865	F
<b>50</b>	5.209302	1.641111	F
<b>51</b>	3.906977	1.615608	F
<b>52</b>	3.581395	1.546618	F
<b>53</b>	5.333333	2.079712	F
<b>54</b>	4.232558	1.688014	F
<b>55</b>	5	1.558387	F
<b>56</b>	4.790698	1.4729	F
<b>57</b>	5.372093	1.543392	F
<b>58</b>	4.511628	1.486	F
<b>59</b>	4.767442	1.810514	F
<b>60</b>	5.44186	2.015444	F
<b>61</b>	2.744186	1.310998	F
<b>62</b>	3.119048	1.626044	F
<b>63</b>	5	1.902379	M
<b>64</b>	4.093023	1.98583	M
<b>65</b>	3.906977	1.756809	M
<b>66</b>	3.395349	1.977728	M
<b>67</b>	3.953488	1.926674	M
<b>68</b>	4.547619	2.308018	M
<b>69</b>	4.325581	1.936134	M
<b>70</b>	3.232558	1.509292	M
<b>71</b>	2.744186	1.481521	M
<b>72</b>	2.930233	1.453982	M

73	4.069767	1.968748	M
74	3.395349	1.692273	M
75	3.488372	1.623812	M
76	3.093023	1.54016	M
77	4.818182	1.883499	F
78	7.545455	0.8202	F
79	7.818182	0.873863	M
80	9.454545	0.522233	F
81	8.818182	1.401298	M
82	8	1	M

**Table A2. The means and standard deviations for each photo rated on threat.**

	Threat Mean	SD	Sex of Photo
1	2.166666667	1.337115847	F
2	2.25	1.422226168	F
3	2.75	1.421560176	F
4	2.25	1.215431087	F
5	2.916666667	2.193309386	F
6	2.75	1.912875038	F
7	3	2.044949433	F
8	4.333333333	2.015094554	F
9	2.916666667	1.443375673	F
10	2.5	1.381698559	F
11	2.25	1.484771179	F
12	2.75	1.356801051	F
13	3.25	1.864744682	F
14	1.583333333	0.792961461	F
15	2.75	1.658312395	F
16	2	1.414213562	F
17	2.363636364	1.629277587	F
18	2.333333333	1.922750555	F
19	3.75	2.378884383	F
20	2	1.414213562	F
21	2.583333333	1.880924982	M
22	2	1.044465936	M
23	4.166666667	2.757908738	M
24	3.75	2.958039892	Male
25	2.333333333	1.556997888	Male
26	2	1.348399725	M
27	2.818181818	1.250454463	Male
28	2.5	1.445997611	Male
29	2.416666667	1.56427929	F

30	3.583333333	1.676486224	Male
31	3.25	2.301185465	Female
32	3.166666667	1.94624736	F
33	2.545454545	1.752919642	F
34	2.833333333	2.208797836	F
35	2.583333333	2.583333333	F
36	3.333333333	2.059714602	F
37	2.75	2.261335084	F
38	1.833333333	1.193416283	F
39	2.818181818	2.088931871	F
40	3.5	2.393172106	M
41	3	1.809068067	M
42	3.833333333	1.642245322	M
43	5.083333333	2.539088359	M
44	3.833333333	1.898963034	M
45	2.636363636	1.501514387	F
46	2.916666667	2.065224326	M
47	2	1.341640786	M
48	2.166666667	1.403458931	M
49	2.416666667	1.443375673	F
50	1.916666667	1.240112409	F
51	2.333333333	2.309401077	F
52	2.727272727	2.412090757	F
53	2.083333333	0.99620492	F
54	2.166666667	1.337115847	F
55	2.416666667	1.676486224	F
56	2.583333333	0.900336637	F
57	3.166666667	2.249579085	F
58	1.916666667	1.240112409	F
59	3.333333333	2.386832566	F
60	1.916666667	1.505042031	F
61	4.416666667	2.314316445	F
62	3.416666667	1.56427929	F
63	2.083333333	1.378954369	M
64	3.416666667	2.391588796	M
65	3.727272727	2.796101182	M
66	3.333333333	2.674231694	M
67	3.333333333	2.424621183	M
68	2.916666667	2.353269808	M
69	2.25	1.356801051	M
70	2.75	1.95982374	M
71	4.083333333	2.234373344	M
72	4	2.628514963	M

73	3.166666667	2.552479484	M
74	4.166666667	2.289634085	M
75	4.083333333	2.503028469	M
76	4.916666667	2.234373344	M
77	2.666666667	1.874873733	F
78	2.363636364	1.858640755	F
79	3.416666667	2.252271581	M
80	2.916666667	2.353269808	F
81	1.916666667	2.020725942	M
82	2.833333333	2.124888589	M



## **APPENDIX B**

### **Department of Psychology INFORMATION**

You are invited to be a participant in the research project “Threat detection: the role of threat item recognition on high speed decision making”.

The threat detection task will involve a computer simulation task where people (targets) will be presented to you on a computer screen and will be either holding a threatening object (a gun) or a non-threatening object, such as a water bottle, a cell phone, a wallet or a coffee mug. You will be required to select the target holding a gun. You will select the threatening target (holding a gun) with the click of a mouse, however, if they are not holding a gun you will not select at all. You will be required to select the target with a gun as fast as possible, as you will only have limited time to do so. There will be approximately 32 pictures that you will have to either select or refrain from selecting (if the person is not holding a gun). The task will take approximately 40 minutes.

The results of the project may be published, but you can be assured of the complete confidentiality of data gathered in this investigation. The identity of participants will not be made public. The anonymous results may be published in a journal or other publication, as well as the Master's of Applied Psychology dissertation for Jessie Kendall. In order to maintain confidentiality, all data will be kept secure on a computer. You have the right to withdraw from the project at any time, including withdrawal of any information you provide.

Prior to proceeding with the task, you will be asked to fill out a brief questionnaire, as well as a consent form. Again, all gathered information remains absolutely confidential.

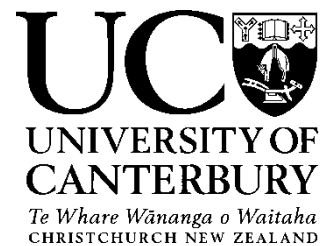
This research is being carried out by Jessie Kendall under the supervision of Professor Deak Helton (Department of Psychology) and secondary supervisor Kumar Yogeewaran. If you would like to discuss any concerns you may have about your participation in this study, then please contact Jessie (extension TBA) or alternatively by e-mail at [jrk34uclive.ac.nz](mailto:jrk34uclive.ac.nz).

Your participation is sought for part of your credit or assessment for PSYC101. You are welcome to discuss your individual results at the end of your participation.

This proposal has been reviewed and approved by the Department of Psychology, University of Canterbury.

## APPENDIX C

# Questionnaire



***“Threat detection: the role of threat item recognition on high speed decision making”***

Please be reassured that all responses given are 100% confidential and will not be used for anything other than for the results of this study. You have the explicit right to refuse to continue and to withdraw all information provided thus far.

Number Code: .....

Gender (please circle one):    M        F

Age: .....

Is English your first language (please circle one):    Y        N

Ethnicity (please circle one):

- a. New Zealand Maori
- b. New Zealand Pakeha
- c. New Zealand Asian
- d. Indian
- e. Asian (other)
- f. Pacific Island
- g. African
- h. European
- i. Other

New Zealand Resident Status (please circle one):

- a. New Zealand Citizen
- b. Resident

c. Temporary Visa

What is your sexual orientation? (please circle one):

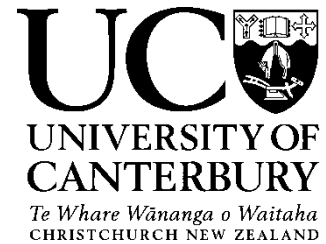
- a. Heterosexual
- b. Bisexual
- c. Lesbian
- d. Gay
- e. Transsexual
- f. Asexual

If you are female:

- Are you on the contraceptive pill? (please circle one): Y N
  
- What stage of your menstrual cycle are you at?
  - a. Beginning
  - b. Middle
  - c. End

Thank you for answering this questionnaire.

## APPENDIX D



### Debrief:

#### *Does Physical Attractiveness and Sex Impact Decisions in a Threat Detection Task?*

Thank you for your participation in the study. The purpose of the study was to see if peoples gender and physical attractiveness stereotypes moderated participants detection of threat and decision-making using a computer simulation task. None of the information you provided will be linked back to you in any way as each participant is given unique codes as identifiers.

You were not told about the real purpose of the study because this may have caused bias in the results. You were told to indicate who you found more of a threat – our purpose was to see if you selected physically unattractive people as being more threatening than physically attractive people. The halo effect is associated with this concept – that people perceive attractive people to be more socially desirable and also have other attractive traits such as personality – a common stereotype. Past studies have shown the effect of race in threat detection have shown that people have a bias towards black being more threatening than whites when they are associated with a weapon, we wanted to extend these stereotype studies by investigating the effect of attractiveness and gender on threat detection. If a halo effect is not seen the results will show more of an evolutionary perspective of detecting threat in that if the participant is male, attractive female targets are less likely to be selected as threatening but if the target is male and attractive they are likely to be selected as threatening because in terms of mate selection physically attractive males may be seen as rivals and as threatening competition. Also in respect to gender, we wanted to ascertain whether there is a bias towards men with a weapon versus a woman with a weapon – to see who is perceived to be more threatening. Past studies have shown a bias towards men being more threatening even when not associated with a weapon, however, women can be just as capable of being as threatening and are nowadays often used in terrorist attempts because of the 'known' stereotype towards men and therefore it is assumed that woman are unlikely to be involved in terrorism schemes. Similarly, policemen have been known to take down a man over a female in a crime, even when it is the female that is guilty. We want to show any effects of gender and physical attraction in threat detection because of the serious implications that it is capable of having in the real world.

In the study you were asked to first complete a questionnaire, which involved questions about your

sexual orientation. This was for the purpose of ascertaining who you are usually attracted to because the experiment involved the interaction between participant gender and target gender and attractiveness. If you are, for example, a male attracted to other males, this will decrease the possibility of observing an evolutionary perspective and likely increase the chances of observing halo effects. Therefore, it was important that we ask this question.

If you are female, you were also asked to answer a question regarding the stage of your menstrual cycle. This is because your hormones can vary considerably during each phase of a cycle. Hormone levels contribute to how attractive we find others so your reactions may possibly vary depending on where you are at in your cycle. Therefore, it was important that we ask that question so that we can take it into consideration to ensure extra reliability in our results.

You were asked to complete the Benevolent Sexism Inventory. This is because high levels of sexism may bias the results, for example, a participant who is deemed a sexist male may downplay the association between females and weapons. A known stereotype is men being more associated with weapons yet this may be more subtle with the attractiveness. Therefore, it is important to consider the effect of sexism in the results of this study.

Any inquiries or complaints can be addressed to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch, ([human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz)) or (03 364 2987).

If you are interested in learning more about the study, or if you have any concerns regarding any aspect of this study, feel free to contact Jessie Kendall ([jessie.kendall@pg.canterbury.ac.nz](mailto:jessie.kendall@pg.canterbury.ac.nz)) or Deak Helton ([deak.helton@canterbury.ac.nz](mailto:deak.helton@canterbury.ac.nz)) or Kumar Yogeewaran ([kumar.yogeewaran@canterbury.ac.nz](mailto:kumar.yogeewaran@canterbury.ac.nz)). If any distress was experienced due to the study, please contact either Lifeline (0800 534 354) or the UC Health Centre (03 364 2402).

Thank you again for your participation. We hope the information provided by you will help with further understanding gender and physical attractiveness stereotypes.

