

The weapon focus effect on memory for female versus male perpetrators

Kerri L. Pickel

Ball State University, Muncie, IN, USA

Previous research suggests that weapons are often inconsistent with the schema activated by eyewitnesses, which leads them to attend to weapons more than they would to neutral objects. Therefore an especially strong weapon focus effect should occur when a perpetrator holds an object primarily associated with the opposite rather than the same gender. As predicted, a handgun reduced the accuracy of witnesses' descriptions of a female perpetrator more than descriptions of a male perpetrator (Experiment 1). Additionally, memory for a female perpetrator was more severely impaired if she carried a folding knife as opposed to a knitting needle, but the reverse was true when the perpetrator was male (Experiment 2). Finally, the weapon focus effect was eliminated for perpetrators of both genders if witnesses saw them as dangerous individuals (Experiment 3).

Keywords: Eyewitness memory; Weapon focus effect; Gender stereotypes.

On a winter evening during her first term as an Indiana state senator, Sue Errington was mugged. As she left an Indianapolis drugstore and crossed the parking lot, two men approached. One, armed with a silver handgun, grabbed her purse. Initially, she resisted, but then, as she later told a reporter, "I looked up at what would be his face but saw his gun instead of his face and just sort of fixated on that" (Brilliant, 2007). She added, "I decided I better let it go." After striking her in the face with the gun the robber took the purse, which contained \$80 in cash and a digital camera. The senator ended up with eight stitches above her eye and a skull fracture. No arrests have been made.

Ms Errington's description of her experience illustrates the "weapon focus effect": Witnesses to a crime committed by an armed perpetrator tend to direct their attention to the weapon. As a result, their subsequent memory for the perpe-

trator's physical features and clothing is less accurate than it would have been if no weapon had been visible. Loftus, Loftus, and Messo (1987) demonstrated the effect empirically by having participants view a slide sequence depicting customers placing orders at a Taco Time fast food restaurant. In different versions of the slide sequence, the target person held either a handgun or a personal cheque while interacting with the cashier. Witnesses who saw the gun remembered the target more poorly than those who saw the cheque. Data obtained using a corneal reflection device revealed that the witnesses who saw the gun looked at it longer and more frequently than the other witnesses looked at the cheque. Other studies have obtained the weapon focus effect with various types of weapons, with live, staged events as well as videos and slides, and with community samples in addition to college participants (e.g., Cutler, Penrod, & Martens, 1987;

Address correspondence to: Kerri Pickel, Department of Psychological Science, Ball State University, Muncie, IN 47306, USA.
E-mail: kpickel@bsu.edu

Thanks to Kate Bernhardt, Audra Brugh, Nathan Felt, Ashley Ford, Peyton Groff, Kelli Hammes, Zach Harris, Chris Jaberg, Tanya Karam, Jennifer Lambert, Jodie McClain, Nick Mitchell, Ashley Montero, Erin Mylet, Brian Salisbury, and Todd Warner for their assistance with this project.

Kramer, Buckhout, & Eugenio, 1990; Maass & Köhnken, 1989; Mitchell, Livosky, & Mather, 1998; O'Rourke, Penrod, Cutler, & Stuve, 1989; Pickel, 1998, 1999; Pickel, Ross, & Truelove, 2006; Tooley, Brigham, Maass, & Bothwell, 1987).

Why do witnesses focus on weapons? One seemingly logical possibility is based on Easterbrook's (1959) cue-utilisation hypothesis. The recognition that weapons can cause harm, either to the witness or to someone else, might raise the witness's anxiety to a point above the optimal level, thus restricting his or her attentional focus to central information (the weapon, because it is the source of the anxiety) at the expense of peripheral information (the perpetrator's features and clothing). Consequently, the accuracy of the witness's memory for the perpetrator's appearance declines. In real life, at least some witnesses surely feel frightened at the sight of a weapon. In her meta-analysis of the weapon focus literature, Steblay (1992) utilised this commonsense notion by grouping studies into three categories based on their realism, assuming that those employing scenarios that more closely approximated a real-life experience would also produce higher levels of emotional arousal. In support of the Easterbrook hypothesis, Steblay reported a smaller effect size associated with the least arousing studies compared to the other two groups. More recently, Davies, Smith, and Blincoe (2008) obtained results that also seem consistent with the hypothesis: children who saw a threatening item in a display (a syringe filled with red liquid) subsequently recalled less correct information about the experimenter than did children who saw other objects. Taking a slightly different perspective, Hope and Wright (2006) have argued that witnesses' fear reactions may contribute to the weapon focus effect, but whether they do or not, the threatening nature of a weapon makes it a crucial source of information during attempts to interpret a visual scene, and therefore witnesses will attend closely to it.

On the other hand, some results contradict the Easterbrook hypothesis. Researchers have not found increased memory impairment for the target person's appearance when witnesses are threatened with a painful stimulus (Maass & Köhnken, 1989), when the target behaves threateningly towards another individual (Pickel, 1999), or when the target holds an object rated as especially threatening (Pickel, 1998). Moreover, witnesses can exhibit the effect even when their self-reported anxiety is low (Kramer et al., 1990).

An alternative explanation for the effect is that weapons are unusual or unexpected within many contexts, and this unusualness attracts attention. Everyone knows, for example, that convenience stores sometimes get robbed, but the probability of witnessing a robbery during any particular shopping trip to one of these stores is low, and most people fortunately have never seen a gun in this setting. Therefore, although convenience store customers anticipate seeing objects like the cash register, the shelves of cigarettes behind the counter, and the inevitable slush machine, a handgun is unexpected. Furthermore, past research on attentional processes has shown that people look longer and more often at unusual rather than typical objects in visual scenes (Gordon, 2004; Henderson, Weeks, & Hollingworth, 1999; Loftus & Mackworth, 1978). Thus, a gun will draw witnesses' attention during a convenience store robbery, and subsequent memory for the perpetrator will be less accurate than it would have been in the absence of the gun. The unusualness explanation is supported by two independent studies (Mitchell et al., 1998; Pickel, 1998) demonstrating that witnesses' memory for a target person was impaired if that person held an object that was rated as "novel" or "unusual", even if the object was not a weapon. Some other findings are also consistent with the unusualness hypothesis (Pickel, 1999; Pickel, Narter, Jameson, & Lenhardt, 2008).

An interesting aspect of this explanation is that it allows for the possibility that a weapon focus effect will not occur if the weapon appears within a context in which it would be expected. For example, Pickel (1999) asked witnesses to watch a videotaped story depicting a target individual carrying either a gun or a neutral object. The gun's presence led to less accurate descriptions of the target if the story took place at a baseball field, where guns are out of place, but not if the setting was a shooting range, where it would be normal to see them.

In the latter experiment, "context" refers to the physical location where the weapon appears, but it could instead be defined by the person schema of the target individual (person schemas are prototypical representations of specific individuals or types of individuals; see Green, Lightfoot, Bandy, & Buchanan, 1985). As an illustration, some people, due to their occupation, commonly carry a weapon or an object that can easily become a weapon, so a weapon focus effect should not occur with such target persons.

In contrast, the effect should emerge if the weapon is incompatible with the target's occupation. Accordingly, Pickel et al. (2008) showed adult and child witnesses a video in which the target, who carried either a chef's knife or a water bottle, robbed a woman after delivering some items to her house. The knife was associated with poorer memory performance if the target was a mail carrier but not if he was a chef. Both sets of results were explained by proposing that witnesses activated an appropriate person schema upon noticing the target's clothing (e.g., a postal service uniform). If the object held by the target was consistent with the schema, the witnesses paid no special attention to it and encoded the target's appearance normally, so that their subsequent memory of him was fairly good. On the other hand, if the object was unexpected given the schema, it attracted the witnesses' attention at the expense of the target's appearance, leading to a less accurate memory representation of him.

If a target's occupation can influence the weapon's effect, then other aspects of a person schema may also matter. For example, a stronger weapon focus effect should probably occur if the target is female rather than male. Research on gender stereotypes has indicated that people from many cultures associate aggressiveness, dominance, strength, and ruggedness with men, whereas women are seen as gentle, nurturing, pretty, and dainty (Cejka & Eagly, 1999; Williams & Best, 1990). There is variability within each gender category, and a few subtypes are atypical members (e.g., male "sissies" and female athletes; Deaux, Winton, Crowley, & Lewis, 1985; Eckes, 1994; Vonk & Ashmore, 2003), but the descriptions above represent the prototypes. Relatedly, people believe that the perpetrators of most types of crimes are usually male (Greenberg, Westcott, & Bailey, 1998; MacLin & Herrera, 2006; Madriz, 1997; Migueles & García-Bajos, 2004), which in fact they are (Federal Bureau of Investigation, n.d.). Therefore, it is logical that most of the time a typical weapon (e.g., a gun) should seem exceptionally unusual in the hands of a woman compared to a man, which would lead in turn to an especially pronounced weapon focus effect.

No published research has examined this prediction. However, results comparing female to male targets would be valuable from both theoretical and practical perspectives. First, they could potentially contribute additional support for the unusualness hypothesis by addressing the as-yet-

unexamined gender prediction, and they could provide new insights about the strength of the weapon focus effect in different circumstances. Additionally, such results could help police investigators evaluate witnesses' descriptions of armed female perpetrators. As noted previously, many types of crimes are committed primarily by men, but not all are (Federal Bureau of Investigation, n.d.). For example, in 2007, 12% of all robbery suspects arrested in the US were women. Police often start with eyewitnesses' descriptions as they try to identify a suspect. It is possible that armed female perpetrators are not remembered and described as well as their male counterparts; if so, some of the former could escape identification or innocent suspects could be arrested based on faulty witness reports. Perhaps an awareness of the impact of a weapon's presence could lead to the development of strategies for improving the investigative process.

The fact that the weapon focus effect has been demonstrated empirically many times with a male target suggests that, regardless of the target's gender, weapons are generally considered unusual. Thus, although people believe that individuals with guns are likely to be men, they apparently realise that men are not usually seen holding guns in most contexts. It was therefore predicted, based on the unusualness hypothesis, that a gun carried by both male and female targets would produce the weapon focus effect, but the effect would be stronger when the target is a woman because guns are less associated with women than with men. Experiment 1 of the present study tested this prediction. Participants watched one version of a video in which a male or female robber held either a gun or a neutral object. The participants later tried to remember that person's appearance.

The second experiment extended and generalised the first set of findings by including objects that are not weapons *per se* but could be used as weapons and that are primarily associated with one gender. It was predicted that memory for the target would be worse when he or she carried an object associated with the opposite gender rather than an object that is consistent with the target's gender stereotype or an object that is neutral.

Finally, Experiment 3 investigated whether the gender effect demonstrated in the first experiment can be reduced or eliminated by leading witnesses to create a person schema for the target that is consistent with possession of a weapon.

A second purpose was to replicate the Experiment 1 findings using different targets and objects.

EXPERIMENT 1

In Experiment 1 participants watched a video of a perpetrator who waits in a parked car until two victims happen along, and then emerges from the car and robs them. The perpetrator, who is first seen while still in the car, holds either a weapon (a handgun) or a neutral object that is not a weapon nor associated with one gender more than the other (a music CD). Within this setting, the CD should not seem unusual, because many cars are equipped with CD players and many drivers keep CDs in their cars. In contrast, the gun is unexpected.

In addition to the object, the perpetrator's gender was also manipulated. After watching the video the participants completed several questionnaire items, including a section that asked them to describe the perpetrator. In some studies of the weapon focus effect, witnesses are also required to identify the target person in a line-up. However, this variable is a less sensitive measure of witnesses' memory than description accuracy: in her meta-analysis, Steblay (1992) computed a moderate effect size (.55) for descriptions but only a small effect size (.13) for identification. Moreover, some researchers have failed to obtain an effect on identification accuracy (e.g., Cutler & Penrod, 1988; Cutler et al., 1987; Shaw & Skolnick, 1994). Therefore in the present study, as in several others (Davies et al., 2008; Hope & Wright, 2006; Mitchell et al., 1998; Pickel et al., 2006, 2008; Shaw & Skolnick, 1999), witnesses did not attempt to identify the perpetrator.

Using two different perpetrators created the possibility that one would be described more accurately than the other due to, for example, more memorable characteristics associated with one. This difference would produce a main effect of perpetrator gender. However, as long as the accuracy scores do not approach the floor or ceiling, the main effect would not interfere with a test of the prediction that the weapon focus effect should be larger with the female rather than the male perpetrator. Within each gender a weapon focus effect would be revealed by a difference between object conditions. Because it was hypothesised that this difference would be greater for the woman than for the man, an interaction was expected.

Method

Participants. The participants were 127 psychology students at a Midwestern (US) university who served as eyewitnesses in exchange for course credit. Most were White (89%) and female (75%), and they ranged in age from 18 to 48 years ($M = 19.31$, $SD = 2.98$).

Stimulus. A videotape (running time approximately 1 minute 30 seconds) was created that depicts a perpetrator (visible for a total of approximately 30 s) waiting in a car in an urban parking lot until a male and a female victim walk into the vicinity. Upon spotting the victims, the perpetrator suddenly jumps out of the car, quickly approaches them, and robs them. In different versions the perpetrator is either male or female. In the former condition, the man is wearing jeans and a t-shirt. The woman is wearing a sweater and jeans. Both perpetrators are White and in their early 20s.

In different conditions the perpetrator can be seen holding either a weapon or a neutral object while waiting in the car. He or she continues to hold the object while quickly emerging from the car and approaching the victims. The weapon was a 9-mm semi-automatic handgun, and the neutral object was a music CD in its plastic case. A pilot study was used to verify that a handgun is more associated with a man than with a woman, whereas a CD is equally associated with both genders. Students attending the same university as the participants in the main experiment ($N = 18$) viewed eight photographs depicting various objects, including a 9-mm handgun and a music CD. Some of the filler objects were expected to be associated with men (e.g., a football), some with women (e.g., a high-heeled shoe), and some with both men and women equally (e.g., a mobile phone). As they viewed the photos, the participants completed a form asking them to identify each object and to rate on a 9-point scale (a) the extent to which they thought the object belongs to a man and (b) the extent to which they thought the object belongs to a woman.

Within each participant's data set a difference score was calculated for each object by subtracting the "man" rating from the "woman" rating. A positive difference score indicated that the participant thought an object more likely belonged to a woman, and a negative score indicated the belief that the object was more likely owned by a man. The results revealed that, as expected,

participants thought the gun was probably owned by a man ($M = -3.06$; $SD = 1.73$), whereas the CD could be owned by either a man or woman ($M = 0$; $SD = 0$). These objects' scores differed significantly, $t(17) = 7.49$, $p < .001$.

Procedure and questionnaire. The participants were tested in groups of up to six individuals. They viewed one of the four versions of the video, selected at random. Afterwards, they completed a written questionnaire in which the first section required them to remember the perpetrator's appearance. Some of these items dealt with physical characteristics, such as race, height, weight, age, and hair colour and length. Additional items asked about clothing (shirt, trousers, glasses, hat, shoes, and jewellery). Some questions in this section presented witnesses with alternatives (e.g., "Did the robber have any tattoos that you could see?" followed by the alternatives "yes" and "no"). However, other items were open-ended. For example, witnesses were asked to describe the robber's footwear.

In the second section of the questionnaire witnesses indicated whether the perpetrator was carrying any object, identified the object, and used a 9-point scale to rate how unusual the object seemed and the degree to which the perpetrator seemed threatening during the interaction with the victims.

The final section of the questionnaire asked witnesses to provide demographic information. After completing the form, they were thanked and debriefed.

Results

Descriptions of the perpetrator. To determine how witnesses' memory reports of the perpetrator should be scored, two judges studied the videos and created an answer key that specified the correct responses to each questionnaire item. Two different individuals, who were blind to the hypotheses, then worked independently to compare each witness's report to the answer key and to calculate the number of correct and incorrect details given by each witness. For example, the male perpetrator wore a black t-shirt, so reporting that it was a "t-shirt" constituted one detail, and specifying that it was "black" was another. A detail was counted as incorrect if it did not appear on the answer key in connection with a particular clothing item or physical characteristic. For

example, a witness could have stated that the man's shirt was "grey". Inter-rater reliability was high; using a sample of 40 witnesses' questionnaires, $r = .98$. When the judges disagreed, the score of the arbitrarily designated primary judge was entered into the data analyses. The number of correct and the number of incorrect details were analysed separately.

Preliminary factorial analyses of variance revealed that there were no main effects or interactions related to witness sex for either correct details ($ps > .56$) or incorrect details ($ps > .24$). The non-significant three-way interactions (for correct details $p = .56$; for incorrect details $p = .71$) indicate that the critical Object $\times$ Perpetrator Gender interactions (discussed below) did not differ for male versus female witnesses.

To test the prediction that a weapon focus effect would be obtained with both perpetrators but would be stronger when the perpetrator is a woman, 2×2 factorial analyses of variance were performed. When examining the number of correct details, a main effect of object emerged, such that more correct details were reported when witnesses saw the CD ($M = 21.79$, $SD = 3.74$) instead of the gun ($M = 17.39$, $SD = 3.77$), $F(1, 123) = 54.50$, $p < .001$, $\eta^2 = .31$. Thus, the standard weapon focus effect appeared when collapsing across perpetrator gender. There was also a main effect of perpetrator gender, revealing that witnesses performed better when describing the man ($M = 21.11$, $SD = 4.04$) rather than the woman ($M = 17.92$, $SD = 4.08$), $F(1, 123) = 27.45$, $p < .001$, $\eta^2 = .18$. However, as predicted, there was an interaction between perpetrator gender and object, $F(1, 123) = 4.31$, $p = .04$, $\eta^2 = .03$ (see Table 1). Simple effects analyses revealed that the effect size was larger when the perpetrator was female, $F(1, 123) = 43.03$, $p < .001$, $\eta^2 = .49$, rather than male, $F(1, 123) = 14.66$, $p < .001$, $\eta^2 = .16$.

In terms of incorrect details, the standard weapon focus effect was again obtained, so that more incorrect details were reported when the perpetrator held the gun ($M = 6.62$, $SD = 2.08$) as opposed to the CD ($M = 4.19$, $SD = 1.61$), $F(1, 123) = 61.56$, $p < .001$, $\eta^2 = .33$. However, an interaction also occurred, $F(1, 123) = 12.49$, $p < .001$, $\eta^2 = .09$. Simple effects analyses indicated that the effect of the object was larger with the female, $F(1, 123) = 62.29$, $p < .001$, $\eta^2 = .50$, than the male perpetrator, $F(1, 123) = 9.68$, $p < .01$, $\eta^2 = .14$. There was no main effect of perpetrator gender ($p = .30$).

TABLE 1
Experiment 1

Condition	Correct	Incorrect	Unusualness	Threat
<i>Male perpetrator</i>				
CD	22.70 (3.70)	4.88 (1.52)	1.73 (1.39)	5.03 (2.22)
Gun	19.52 (3.77)	6.24 (1.92)	6.00 (1.96)	5.93 (1.44)
<i>Female perpetrator</i>				
CD	20.80 (3.60)	3.43 (1.36)	1.56 (.87)	5.48 (2.29)
Gun	15.13 (2.13)	7.03 (2.20)	7.48 (1.69)	5.56 (1.61)

Mean number of correct and incorrect details and unusualness and threat ratings by perpetrator gender and object. Standard deviations are in parentheses.

Identification and unusualness of the object carried by the perpetrator. Witnesses were asked to state whether the perpetrator was carrying any object, and if the answer was yes they were to identify the object and rate its unusualness. Unfortunately, 18 witnesses failed to complete the last page of the questionnaire, which contained these items (as well as the question about threat discussed in the following section). All of the 109 witnesses who completed this section correctly indicated that the perpetrator was carrying something, and all correctly named the object.

With respect to the unusualness ratings, a factorial analysis of variance revealed a main effect of object, $F(1, 105) = 294.53$, $p < .001$, $\eta^2 = .74$; witnesses rated the gun ($M = 6.69$, $SD = 1.97$) as more unusual than the CD ($M = 1.65$, $SD = 1.17$). There was also a main effect of perpetrator gender, $F(1, 105) = 4.85$, $p = .03$, $\eta^2 = .04$. An object was rated as more unusual if carried by the woman ($M = 4.52$, $SD = 3.27$) instead of the man ($M = 3.83$, $SD = 2.73$). Of most importance, however, was the significant interaction, $F(1, 105) = 7.76$, $p = .006$, $\eta^2 = .07$. Consistent with the prediction, simple effects analyses showed that the CD was rated similarly when held by the two perpetrators, $F(1, 105) = 0.17$, $p > .25$, $\eta^2 = .01$, but the gun was rated as more unusual if held by the woman rather than the man, $F(1, 105) = 12.34$, $p < .001$, $\eta^2 = .14$.

Unusualness ratings were correlated with memory performance. When an object was rated as more unusual, witnesses reported fewer correct details, $r(107) = -.59$, $p < .001$, and more incorrect details, $r(107) = .65$, $p < .001$, about the perpetrator.

Threat ratings. The witnesses were asked to rate the extent to which the perpetrator seemed threatening. A factorial analysis of variance showed no effects (overall $M = 5.50$, $SD = 1.93$;

$ps > .19$). Moreover, threat ratings were not correlated with either correct, $r(107) = -.12$, $p = .20$, or incorrect details, $r(107) = -.09$, $p = .34$.

Discussion

As predicted by the unusualness hypothesis, witnesses rated the gun as more unusual if it was held by the female rather than the male perpetrator, and a stronger weapon focus effect was observed with her than with him. The explanation based on Easterbrook's (1959) hypothesis does not easily account for the effect because (a) witnesses' ratings of the level of threat did not vary across the scenarios¹ and (b) the accuracy of witnesses' descriptions of the perpetrator was correlated with unusualness but not with threat ratings. Further evaluation of the results is postponed until the General Discussion.

EXPERIMENT 2

The purpose of the second experiment was to extend the findings of Experiment 1 in two ways. First, Experiment 1's results showed that witnesses' memory for a female perpetrator can be strongly impaired if she is carrying an object that is more associated with men than with women. However, the reverse could also be true: Memory for a male perpetrator could be greatly impaired if he possesses an object that is commonly

¹ At first glance it may appear puzzling that the threat ratings in the weapon condition were not greater than those in the CD condition. However, witnesses were not asked how threatening each object was. Instead they rated how threatening the perpetrator seemed as he or she interacted with the victims, and the perpetrator's words and behaviour remained consistent across conditions.

associated with women, because that object would seem particularly unusual in his hands.

Second, because prototypical weapons, like guns of various types, are mainly associated with men, it was necessary to choose critical objects for Experiment 2 that are not specifically designed to be weapons but can be used as such, so as to have an object that is consistent with the female stereotype. Taking this step increases the study's generalisability, because many real-life crimes have been committed with objects that were made for other purposes but used as weapons against human beings (e.g., steak knives, baseball bats, liquor bottles).

As in the first experiment, witnesses watched a video of a male or female robber who sits in a car until two victims come by. While waiting, the perpetrator is seen holding an object that is either associated primarily with men (a folding camping knife), with women (a knitting needle), or that is neutral (a music CD). As before, the CD should not be considered unusual within the setting, but the other two objects should be relatively unexpected. After watching the video the witnesses completed the same questionnaire as in Experiment 1.

Method

Participants. Psychology students ($N=181$) at the same university as the Experiment 1 participants served as witnesses in exchange for course credit. One student did not report demographic information; of those who did, most were White (88%) and female (64%), and they ranged in age from 18 to 48 years ($M=19.69$, $SD=3.09$).

Stimulus and procedure. The CD videos from Experiment 1 (one version with a male perpetrator and one with a female) were again used in Experiment 2, along with new versions in which the male or female perpetrator carried either a folding knife or a knitting needle. It was expected that the knife, which was a type that might be used on a camping trip, would be more associated with a man than with a woman, whereas the reverse would be true for the knitting needle. To verify this assumption, 18 pilot participants completed the pilot procedure used in Experiment 1. As before, a score was calculated for each object such that a positive value indicated that participants thought an object would more likely belong to a woman, and a negative value indicated the belief that the object would more likely belong to

a man. As expected, participants thought the knife was probably owned by a man ($M=-4.78$; $SD=1.59$) but the knitting needle was probably owned by a woman ($M=5.28$; $SD=1.74$). The difference between the mean scores was significant, $t(17)=14.51$, $p<.001$.

The participants were tested in groups of no more than six individuals. The procedure and the questionnaire were the same as in Experiment 1.

Results

Accuracy of descriptions of the perpetrator. As in Experiment 1, two judges scored each witness's questionnaire, counting the number of correct and incorrect details. Inter-rater reliability was again high; using a sample of 40 questionnaires, $r=.99$. When the judges disagreed, the primary judge's scores were used.

There were no main effects or interactions related to witness gender for either correct ($ps>.27$) or incorrect details ($ps>.42$). As in Experiment 1, the three-way interactions were not significant (for correct details $p=.41$; for incorrect details $p=.64$), indicating that the critical two-way interactions discussed below were the same for male and female witnesses.

For the number of correct details, a 2×3 factorial analysis of variance revealed a main effect of object, $F(2, 175)=17.03$, $p<.001$, $\eta^2=.16$. A Newman-Keuls test clarified that the mean was higher when witnesses saw the CD ($M=21.35$, $SD=4.14$) rather than the knife ($M=17.85$, $SD=4.29$) or knitting needle ($M=17.95$, $SD=3.35$). There was also a main effect of perpetrator gender such that witnesses reported more correct details about the man ($M=20.04$, $SD=4.66$) than the woman ($M=18.08$, $SD=3.56$), $F(1, 175)=12.63$, $p<.001$, $\eta^2=.07$. More important, however, was the significant interaction, $F(2, 175)=5.90$, $p=.003$, $\eta^2=.06$ (see Table 2). Simple effects analyses indicated that, as predicted, the mean number of correct details for the woman was highest if she carried the CD and lowest if she carried the knife, $F(2, 175)=23.19$, $p<.001$, $\eta^2=.28$. The mean for the man was also highest if he carried the CD, but it was lowest if he carried the knitting needle, $F(2, 175)=22.52$, $p<.001$, $\eta^2=.16$.

Additional analyses were conducted using only the knife and knitting needle conditions and excluding the CD condition. A 2×2 analysis of variance revealed a main effect of perpetrator gender; witnesses reported more correct details about the man ($M=18.88$, $SD=4.41$) than the

TABLE 2
Experiment 2

Condition	Correct	Incorrect	Unusualness	Threat
<i>Male perpetrator</i>				
CD	22.33 (4.34)	5.00 (1.58)	2.17 (1.44)	4.40 (1.81)
Knife	20.03 (4.82)	7.03 (2.03)	5.97 (2.69)	4.86 (2.10)
Knitting needle	17.77 (3.72)	8.23 (2.62)	8.50 (.68)	4.23 (1.87)
<i>Female perpetrator</i>				
CD	20.37 (3.74)	3.83 (2.28)	2.30 (1.93)	4.90 (2.37)
Knife	15.73 (2.24)	6.87 (2.19)	7.83 (1.37)	5.30 (2.14)
Knitting needle	18.13 (3.01)	5.66 (2.15)	4.37 (2.50)	4.44 (1.98)

Mean number of correct and incorrect details and unusualness and threat ratings by perpetrator gender and object. Standard deviations are in parentheses.

woman ($M = 16.97$, $SD = 2.91$), $F(1, 117) = 9.28$, $p = .003$, $\eta^2 = .07$. The interaction was also significant, $F(1, 117) = 12.97$, $p < .001$, $\eta^2 = .10$. Simple effects analyses showed that witnesses reported more correct details about the woman if she carried the knitting needle ($M = 18.13$, $SD = 3.01$) rather than the knife ($M = 15.73$, $SD = 2.24$), $F(1, 117) = 7.00$, $p < .01$, $\eta^2 = .17$, but the pattern was reversed for the man (knitting needle $M = 17.77$, $SD = 3.72$; knife $M = 20.03$, $SD = 4.82$), $F(1, 117) = 6.00$, $p < .025$, $\eta^2 = .07$.

The results regarding incorrect details were similar. A 2×3 analysis of variance that included all conditions showed a main effect of object, $F(2, 175) = 27.44$, $p < .001$, $\eta^2 = .24$. According to a Newman-Keuls test, fewer incorrect details were reported when witnesses saw the CD ($M = 4.42$, $SD = 2.03$) rather than the knife ($M = 6.95$, $SD = 2.10$) or knitting needle ($M = 6.90$, $SD = 2.70$). There was a main effect of perpetrator gender as well; witnesses made more errors describing the man ($M = 6.75$, $SD = 2.49$) than the woman ($M = 5.46$, $SD = 2.51$), $F(1, 175) = 16.42$, $p < .001$, $\eta^2 = .09$. As predicted, however, the interaction was significant, $F(2, 175) = 4.74$, $p = .01$, $\eta^2 = .05$ (see Table 2). Simple effects analyses demonstrated that witnesses reported the fewest incorrect details about the woman if she carried the CD and the most if she carried the knife, $F(2, 175) = 29.90$, $p < .001$, $\eta^2 = .24$. For the man, witnesses also reported the fewest incorrect details if he carried the CD, but they reported the most if he carried the knitting needle, $F(2, 175) = 34.23$, $p < .001$, $\eta^2 = .29$.

A 2×2 analysis of variance that excluded the CD condition revealed a main effect of perpetrator gender, $F(1, 117) = 11.15$, $p = .001$, $\eta^2 = .09$. Witnesses reported more incorrect details about the man ($M = 7.64$, $SD = 2.41$) than about the

woman ($M = 6.24$, $SD = 2.24$). An interaction also emerged, $F(1, 117) = 8.59$, $p = .004$, $\eta^2 = .07$; witnesses' descriptions of the woman contained more errors if she held the knife ($M = 6.87$, $SD = 2.19$) instead of the knitting needle ($M = 5.66$, $SD = 2.15$), but the descriptions of the man showed the opposite pattern (knife $M = 7.03$, $SD = 2.03$; knitting needle $M = 8.23$, $SD = 2.62$).

Identification and unusualness of the object carried by the perpetrator. All witnesses correctly indicated that the perpetrator was carrying an object and correctly identified the object. Regarding ratings of unusualness, there was a main effect of object, $F(2, 175) = 109.72$, $p < .001$, $\eta^2 = .56$. A Newman-Keuls test indicated that witnesses considered the knife ($M = 6.92$, $SD = 2.31$) and the knitting needle ($M = 6.37$, $SD = 2.78$) to be more unusual than the CD ($M = 2.23$, $SD = 1.69$), with no difference between the first two objects. There was also a main effect of perpetrator gender, $F(1, 175) = 6.27$, $p = .013$, $\eta^2 = .04$. Witnesses rated the object they saw as more unusual if it was held by the man ($M = 5.54$, $SD = 3.17$) rather than the woman ($M = 4.83$, $SD = 3.01$).

The interaction was also significant, $F(2, 175) = 39.99$, $p < .001$, $\eta^2 = .31$. As predicted, simple effects analyses showed that the CD was rated similarly when held by the two perpetrators, $F(1, 175) = 0.07$, $p > .25$, $\eta^2 = .002$. However, the knife was rated as more unusual if held by the woman rather than the man, $F(1, 175) = 14.23$, $p < .001$, $\eta^2 = .17$. The reverse was true of the knitting needle: witnesses rated it as more unusual if held by the man as opposed to the woman, $F(1, 175) = 72.88$, $p < .001$, $\eta^2 = .56$.

Unusualness ratings were related to the accuracy of the descriptions of the perpetrator. Specifically, greater unusualness was associated

with fewer correct details, $r(179) = -.45$, $p < .001$, and more incorrect details, $r(179) = .62$, $p < .001$.

Threat ratings. According to a factorial analysis of variance, there were no significant effects related to threat ratings (overall $M = 4.69$, $SD = 2.06$; $ps > .14$). In addition, threat ratings were not related to the number of correct, $r(179) = -.02$, $p = .81$, or incorrect details, $r(179) = -.003$, $p = .97$.

Discussion

The results of Experiment 2 extend the findings from the first experiment and add support for the unusualness hypothesis: Witnesses described a perpetrator less accurately if he or she held an object that was consistent with an opposite-gender rather than same-gender stereotype. Moreover, as in the first experiment, witnesses rated an object as more unusual if it was primarily associated with the opposite gender instead of the perpetrator's gender. Threat ratings, in contrast, did not change across conditions, in contrast to what would be predicted by Easterbrook's (1959) hypothesis, and they were not associated with memory accuracy. Further implications will be addressed in the General Discussion.

EXPERIMENT 3

The data from the first two experiments support the hypothesis that, upon viewing the perpetrator, witnesses activate a gender schema that guides their interpretation of the scene and affects the degree to which they expect to see particular objects in the hands of the perpetrator. Further, the results suggest that the schema activated by witnesses is the prototypical representation of the perpetrator's gender (i.e., that the person is gentle, nurturing, and dainty if female; and aggressive, dominant, and strong if male). Previous research indicates that people activate these stereotypes by default when asked to think about a "woman" or a "man" (Cejka & Eagly, 1999; Williams & Best, 1990). However, not every individual matches the gender stereotype. For example, some female subtypes have characteristics that are similar to the male stereotype (Deaux et al., 1985; Eckes, 1994; Vonk & Ashmore, 2003); the female subtypes

"bitch" and "femme fatale" may be considered strong, aggressive, and even dangerous. It might be possible to induce witnesses to see a female perpetrator as someone who might possess a weapon, thereby reducing or eliminating the weapon focus effect. Although this might be accomplished by prompting witnesses to activate a specific female subtype that seems aggressive, an easier and more direct method might be simply to inform witnesses that the target is aggressive and dangerous. A similar process might work for male targets.

One purpose of Experiment 3 was to investigate this possibility. Previous research has shown that leading witnesses to stereotype a target individual can cause stereotype-consistent distortions in their subsequent reports of the target's behaviour. For example, Leichtman and Ceci (1995) induced children to perceive "Sam Stone" as a clumsy person who always breaks things. After Sam visited their school (without breaking anything), the children described his actions in a series of interviews over several weeks. Many children reported that Sam ripped a book and/or ruined a teddy bear, and some claimed to have actually seen him do so. Thus, it appears that witnesses' perceptions of a target can be influenced by the expectations they develop about that person in advance. Similarly, leading witnesses to view a target as dangerous and aggressive might lead them to see a weapon in the target's possession as normal due to its congruence with the person schema. In this way, the standard weapon focus effect might be attenuated or even eliminated.

In Experiment 3 witnesses watched a video in which a male or female perpetrator robbed two victims while holding either a weapon or a neutral object. Before watching, some witnesses were told that the perpetrator is aggressive and dangerous. It was predicted that the memory reports of witnesses given this information would show a weaker weapon focus effect relative to controls.

A second purpose of this experiment was to replicate the gender-weapon interaction that was first demonstrated in Experiment 1 using different perpetrators and different objects. Thus, the actors who portrayed the perpetrators were not the same individuals who appeared in the Experiment 1 and 2 videos, and they carried new objects (either a switchblade knife or a highlighting pen).

Method

Participants. The participants were psychology students ($N = 255$) at the same university as in the other experiments who earned course credit for participating. Five participants declined to report demographic information, but of the rest 60% were female, 89% were White, and their ages ranged from 18 to 39 years ($M = 19.59$, $SD = 2.33$).

Stimulus. The stimulus was a videotape (running time approximately 1 minute) depicting a perpetrator moving stealthily down a hallway in a classroom building on a university campus, entering a room where two students are studying, stealing a wallet that lies with other items on a table, and leaving quickly. In contrast to the interactions depicted in the previous experiments, in the present scenario the perpetrator does not directly confront the victims.

In one version the perpetrator is male. He is wearing a sweatshirt, jeans, and a baseball cap. In a second condition the perpetrator is female, and she is wearing a pullover knit-shirt and jeans. Both perpetrators are young White adults.

In different conditions the perpetrator holds either a weapon (a switchblade knife) or a neutral object (a highlighting pen) for the duration of the scene. The results of a pilot study verified that a switchblade knife is more associated with a man than with a woman, whereas a highlighting pen is equally associated with both genders. Pilot participants ($N = 18$) were asked to complete the pilot procedure used in the two previous experiments. As before, a difference score was calculated for each object such that a positive value indicated that the participant thought an object more likely belonged to a woman, and a negative value indicated the belief that the object was more likely owned by a man. As predicted, participants thought the switchblade was probably owned by a man ($M = -4.11$; $SD = 1.71$), whereas the pen could be owned by either a man or a woman ($M = 0.22$; $SD = 1.23$). The two objects' scores differed significantly, $t(17) = 8.27$, $p < .001$.

Procedure and questionnaire. The participants were tested in groups of up to 10 individuals. They were assigned randomly to watch one of the four versions of the video. Before watching, participants were given information that established the setting as a classroom building on a university campus, and they were told that the first person

they would see in the video either (a) has a criminal record for robbery, has attacked and injured another person in the past, and is known to be mean-tempered, violent, and dangerous, or (b) is a college psychology student, is from a medium-sized city in Indiana, and is a lifelong resident of the state. To verify that the "dangerous information" would influence witnesses to expect a weapon, a new group of pilot participants were asked to read about either male or female characters described using each of the two statements above. The participants used a 9-point scale to rate how unusual it would be to see each character holding a switchblade knife. The participants who read about the female characters ($N = 18$) indicated that it would be less unusual to see the switchblade with the "dangerous" woman ($M = 1.89$, $SD = 0.58$) than the control woman ($M = 8.11$, $SD = 0.76$), $t(17) = 22.64$, $p < .001$. Participants who read about the male characters ($N = 18$) made similar ratings (dangerous man $M = 1.78$, $SD = 1.26$; control man $M = 5.67$, $SD = 1.75$), $t(17) = 7.92$, $p < .001$.

After watching the video, the witnesses completed a written questionnaire as in the previous experiments. Finally, they were thanked and debriefed.

Results

Accuracy of descriptions of the perpetrator. As before, two judges counted the number of correct and incorrect details in each witness's questionnaire. Inter-rater reliability calculated using a sample of 40 questionnaires was high, $r = .95$. Disagreements were resolved by using the primary judge's scores.

No main effects or interactions related to the sex of the witnesses were discovered for correct ($ps > .13$) or incorrect details ($ps > .34$). The four-way interactions were not significant (for correct details $p = .13$; for incorrect details $p = .81$), and neither were the three-way interactions (for correct details $p = .13$; for incorrect details $p = .61$). Thus, the critical two-way interactions discussed below did not differ for male versus female witnesses.

As a preliminary examination of witnesses' accuracy, three-way analyses of variance were conducted using perpetrator gender, object, and information condition as the factors. Because the knife should impair accuracy relative to the pen only when the control information (not the dangerous information) was presented, an

interaction between the object and the information conditions was predicted. This interaction was found for both the number of correct details, $F(1, 247) = 33.64, p < .001, \eta^2 = .12$, and incorrect details, $F(1, 247) = 47.42, p < .001, \eta^2 = .16$ (see Table 3). Also, to replicate the results of Experiment 1, the knife should have different effects for male versus female perpetrators, which would produce an interaction between perpetrator gender and object. This interaction occurred for correct details, $F(1, 247) = 4.27, p = .04, \eta^2 = .02$, and incorrect details, $F(1, 247) = 5.52, p = .02, \eta^2 = .02$.

To inspect more closely the effect of the weapon within each information condition, separate two-way analyses of variance were conducted for the dangerous and the control information. In the control condition the results should mirror those of Experiment 1. As predicted, there was a main effect of object on the number of correct details, with witnesses reporting more details when they saw the pen ($M = 22.13, SD = 3.11$) as opposed to the knife ($M = 17.69, SD = 3.20$), $F(1, 127) = 88.36, p < .001, \eta^2 = .41$. In addition there was a main effect of perpetrator gender: witnesses reported more details when describing the man ($M = 21.43, SD = 3.75$) rather than the woman ($M = 18.52, SD = 3.40$), $F(1, 127) = 39.49, p < .001, \eta^2 = .24$. Most importantly, an interaction between perpetrator gender and object emerged, $F(1, 127) = 8.64, p = .004, \eta^2 = .06$. Simple effects analyses revealed that the effect size was larger for the female, $F(1,$

$127) = 76.73, p < .001, \eta^2 = .75$, than the male perpetrator, $F(1, 127) = 20.73, p < .001, \eta^2 = .17$.

For incorrect details, witnesses performed more poorly when the perpetrator held the knife ($M = 6.67, SD = 2.17$) instead of the pen ($M = 4.00, SD = 1.83$), $F(1, 127) = 63.95, p < .001, \eta^2 = .34$. Additionally, an interaction occurred, $F(1, 127) = 15.14, p < .001, \eta^2 = .11$. Simple effects analyses showed that the effect was greater with the female, $F(1, 127) = 71.07, p < .001, \eta^2 = .48$, than the male perpetrator, $F(1, 127) = 8.36, p < .01, \eta^2 = .14$. There was no main effect of perpetrator gender ($p = .68$). In sum, when the control information was presented, the standard weapon focus effect emerged for both perpetrators but was stronger for the woman than the man.

It was predicted that, when witnesses received the dangerous information, the weapon focus effect would be reduced or eliminated. Accordingly, for correct details there was no main effect of object ($p = .64$) and no interaction ($p = .86$). The perpetrator gender effect remained; witnesses reported more details about the man ($M = 22.92, SD = 3.30$) than the woman ($M = 21.05, SD = 2.74$), $F(1, 120) = 11.54, p = .001, \eta^2 = .09$. Similarly, for incorrect details, the main effect of object ($p = .34$) and the interaction ($p = .23$) were not significant, but witnesses made more errors when describing the man ($M = 5.03, SD = 1.41$) than the woman ($M = 3.62, SD = 1.40$), $F(1, 120) = 30.87, p < .001, \eta^2 = .21$. Thus, the weapon focus effect disappeared when the dangerous information was presented.

TABLE 3
Experiment 3

Condition	Correct	Incorrect	Unusualness	Threat
<i>No stereotype</i>				
Male perpetrator				
Pen	22.94 (3.91)	4.73 (1.59)	3.76 (2.45)	2.24 (1.44)
Knife	19.88 (2.90)	6.09 (1.80)	6.09 (1.84)	2.78 (1.45)
Female perpetrator				
Pen	21.35 (1.82)	3.29 (1.78)	3.71 (2.20)	1.94 (1.32)
Knife	15.50 (1.57)	7.25 (2.37)	7.97 (1.30)	2.48 (1.39)
<i>Stereotype</i>				
Male perpetrator				
Pen	23.00 (3.25)	5.00 (1.55)	3.78 (2.76)	2.94 (1.54)
Knife	22.84 (3.40)	5.06 (1.29)	4.30 (1.99)	2.87 (1.85)
Female perpetrator				
Pen	21.23 (3.32)	3.90 (1.54)	3.79 (2.51)	2.72 (1.91)
Knife	20.87 (2.08)	3.35 (1.23)	4.48 (2.10)	2.90 (1.81)

Mean number of correct and incorrect details and unusualness and threat ratings by stereotype condition, perpetrator gender, and object. Standard deviations are in parentheses.

Identification and unusualness of the object carried by the perpetrator. Almost all witnesses correctly stated that the perpetrator carried an object; one (in the male perpetrator/knife/dangerous condition) left this questionnaire item blank, and two indicated that there was no object (one each in the female perpetrator/pen/dangerous and female perpetrator/knife/control conditions). Of the remaining witnesses, most identified the object correctly, but three (one each in the male perpetrator/knife/dangerous, male perpetrator/pen/dangerous, and male perpetrator/pen/control conditions) left this item blank.

The witnesses were asked to rate the unusualness of the object they saw. As with the number of details, a three-way analysis of variance was initially conducted. Because witnesses in the dangerous information condition (but not the control condition) should see a knife as consistent with the activated schema, the knife should not seem much more unusual to them than the pen. Thus, an object $\times$ information interaction was predicted. This interaction was obtained, $F(1, 244) = 23.89$, $p < .001$, $\eta^2 = .09$. It was also hypothesised that, as in the first experiment, the weapon would be rated as more unusual if the woman rather than the man carried it. This interaction was marginally significant, $F(1, 244) = 3.62$, $p = .06$, $\eta^2 = .02$.

Next, separate two-way analyses of variance were conducted for each of the two information conditions. As expected, the results in the control information condition replicated those of Experiment 1. There was a main effect of object such that witnesses rated the knife ($M = 7.02$, $SD = 1.85$) as more unusual than the pen ($M = 3.73$, $SD = 2.31$), $F(1, 126) = 87.84$, $p < .001$, $\eta^2 = .41$. In addition, an object was rated as more unusual if carried by the woman ($M = 5.74$, $SD = 2.81$) instead of the man ($M = 4.91$, $SD = 2.45$), $F(1, 126) = 6.70$, $p = .01$, $\eta^2 = .05$. More important, however, was the interaction, $F(1, 126) = 7.48$, $p = .007$, $\eta^2 = .06$. Simple effects analyses showed that the pen was rated similarly when held by the two perpetrators, $F(1, 126) = 0.01$, $p > .25$, $\eta^2 < .001$, but the knife was considered more unusual if held by the woman as opposed to the man, $F(1, 126) = 13.76$, $p < .001$, $\eta^2 = .26$.

In contrast, in the dangerous information condition there were no significant effects ($ps > .16$). As predicted, unusualness ratings remained relatively consistent across conditions (overall $M = 4.09$, $SD = 2.35$).

Unusualness ratings were correlated with memory accuracy. When witnesses rated the object they saw as more unusual they reported fewer correct details, $r(250) = -.29$, $p < .001$, and more incorrect details, $r(250) = .28$, $p < .001$, about the perpetrator.

Threat ratings. A three-way factorial analysis of variance showed a significant main effect of information such that witnesses rated the perpetrator as more threatening when the dangerous information was presented ($M = 2.86$, $SD = 1.76$) than when it was not ($M = 2.35$, $SD = 1.42$), $F(1, 244) = 6.07$, $p = .01$, $\eta^2 = .02$. There were no other effects ($ps > .14$). In addition, threat ratings were not correlated with either correct, $r(250) = .05$, $p = .46$, or incorrect details, $r(250) = -.05$, $p = .40$.

Discussion

Using new target individuals and objects, Experiment 3 replicated the results of the first two experiments, suggesting that, by default, the weapon focus effect is stronger with female than male perpetrators. In the control information condition, seeing the knife rather than the pen caused witnesses to report fewer correct and more incorrect details, but this difference was greater when the perpetrator was a woman instead of a man. The pattern of unusualness ratings indicates that witnesses thought the knife was especially unexpected when the woman carried it, which may have led to an increased level of attention directed to it.

However, adding to the previous experiments' findings is the result that the weapon focus effect can be eliminated if witnesses are induced to categorise the target as aggressive and dangerous. When witnesses heard the dangerous information, their accuracy was unaffected by the knife's presence. Unusualness ratings also failed to vary, which suggests that activating the schema caused witnesses to see a weapon as an object that the perpetrator might possess. Because the knife was not unexpected in this condition, witnesses did not direct excessive attention to it and could instead more easily encode details about the perpetrator's physical appearance.

The current data set represents only the second study to examine the circumstances under which the weapon focus effect can be undermined by providing certain information to witnesses. Pickel

et al. (2006) showed that witnesses can overcome the effect if they are educated about it and instructed to try not to look at the weapon too much: educated witnesses' descriptions of a target armed with a weapon were not significantly worse than their descriptions of a target carrying a neutral object. The present data complement that discovery by demonstrating that, if witnesses adopt a person schema for the target with which a weapon would be consistent, the usual memory impairment can be avoided.

GENERAL DISCUSSION

In Experiments 1 and 3 (control information condition only), a stronger weapon focus effect was observed with a female rather than a male perpetrator. This finding may have occurred because, during visual scene processing, viewers direct their attention mainly to areas that will provide a high level of semantic information, so that they tend to gaze at schema-inconsistent objects (Gordon, 2004; Henderson et al., 1999). In the present experiments the weapons (a handgun and a switchblade knife) were not only primarily associated with men but also inconsistent with the gender stereotype that women are gentle and nurturing (Deaux & Lewis, 1984), and therefore the weapons seemed especially unusual (and thus attention attracting) in the woman's hands. As a result, witnesses spent less time looking at the perpetrator's physical features and clothing than they would have in the absence of a weapon, and the subsequent memory trace of the perpetrator was less elaborate. When later asked to describe the robber, witnesses' reports were not as accurate as they could have been.

This experimental situation can be seen as a specific instance of a more general phenomenon, as shown by the data from the second experiment: Memory for a target individual is especially impaired when he or she holds an object that is inconsistent rather than consistent with the stereotype associated with the target's gender. The present findings fit with those of other studies (Pickel, 1999; Pickel et al., 2008) indicating that the likelihood of obtaining a weapon focus effect depends on context.

The findings from the third experiment demonstrate that other information, in addition to the perpetrator's physical appearance, can influence the person schema activated by witnesses. Providing background information that the

female perpetrator is a dangerous person with a criminal record may have prevented witnesses from seeing her as an example of the prototypical feminine gender stereotype, so that they may not have considered it unusual to observe her holding a weapon. Consequently, the weapon focus effect disappeared. A similar process may have operated with the male perpetrator, so that the "dangerous" information led witnesses to see him as someone who is likely to have a weapon, and thus the weapon's subsequent appearance was not unexpected.

The explanation of weapon focus based on Easterbrook's (1959) hypothesis does not satisfactorily account for the present data because witnesses' ratings of threat remained constant across conditions. Moreover, in all three experiments threat ratings were uncorrelated with the accuracy of witnesses' descriptions of the perpetrator (although unusualness ratings *were* associated with accuracy). These results do not mean that actual witnesses never feel frightened while observing a crime unfold or that their anxiety could not possibly influence their memory performance, but they do suggest that a high level of anxiety is not a necessary force behind the weapon focus effect, at least for bystander witnesses (as opposed to victims).

From a practical point of view, the present results could be informative to police investigators hoping to obtain a helpful description of an unknown perpetrator. The presence or absence of a weapon is an *estimator* variable (Wells, 1978), or one that can only be estimated, and not controlled, by those who work within the criminal justice system. However, the structure and content of an interview with a witness is under the control of police investigators, as is their interpretation and use of the witness's responses. After establishing that a weapon was present, investigators could gather additional information to help them gauge the witness's ability to describe the perpetrator accurately. In particular, investigators might want to consider the specific type of weapon used and the gender of the perpetrator, but it might also be beneficial to try to find out what sort of person schema the witness activated when observing the perpetrator (e.g., did the witness see the perpetrator as a typical man or woman, or as an atypical subtype?). In this way, investigators could try to assess the likelihood that the witness's description contained errors that might hinder their attempts to identify and arrest the guilty individual.

In addition, investigators could consider asking the witness to describe the weapon in detail. Previous research (Pickel et al., 2006) suggests that witnesses exposed to a weapon may be able to remember it better than a neutral object due to the relatively high level of attentional processing given to it. Moreover, a detailed description of the weapon could lead to suspects who are known to own or use certain types of weapons.

Pickel et al. (2006) suggested that individuals who are at risk of encountering armed perpetrators (e.g., convenience store workers) could perhaps receive training that would help them improve their performance as eyewitnesses. In addition to education about the weapon focus effect, it is possible that these individuals could also benefit from coaching involving practice and/or mental preparation designed to get them to stop seeing a weapon as something unexpected and surprising within the context of their workplace. Further research is needed to test this possibility and to determine whether such training could have long-lasting effects.

The witnesses in the current study did not try to identify the perpetrator in a line-up, for reasons noted previously. Future research could measure this variable. However, the present data represent a useful scientific contribution in their own right. In criminal investigations police frequently must begin by asking witnesses for a description of the perpetrator before they can construct a line-up, and they use that information in their search for a suspect.

There are some limitations in the present study that are common to eyewitness memory research. The witnesses in the present study did not observe a real crime. Real witnesses' motivation to remember and describe the perpetrator accurately could be higher than mock witnesses' due to their feelings of responsibility to their community; alternatively, their motivation could be lower due to fears that the perpetrator (or his or her allies) might try to take revenge against witnesses who assist the police. Another potentially important difference is that real witnesses are typically interviewed multiple times and after a delay instead of only once and immediately after the critical event. Finally, the witnesses in the present study were college students and therefore less diverse than witnesses to actual crimes in terms of their age, educational background, and so on.

In summary, the current results constitute a useful contribution to the weapon focus literature

by providing additional support for the unusualness hypothesis and by demonstrating that the extent to which a weapon (or object used as a weapon) decreases the accuracy of witnesses' memory for a perpetrator may depend on the weapon's relationship to the gender stereotype associated with the perpetrator. In some cases, witnesses will probably be guided by a traditional gender stereotype when observing a perpetrator, but not always. As the Experiment 3 data suggest, witnesses' beliefs about the perpetrator's past behaviour or personality may lead to a modification of the person schema. Moreover, individuals can vary in the degree to which their appearance (clothing, hairstyle, body type, etc.) activates a gender stereotype. Some perpetrators do not completely conform to the schema for their gender but rather represent less typical subtypes such as the "sissy", the family man, the female athlete or the "bitch" (Deaux et al., 1985; Eckes, 1994; Vonk & Ashmore, 2003). The present study should be seen as an initial step towards establishing the conditions under which perpetrator gender interacts with a weapon's presence. Future research is needed to confirm the reliability of the findings and to determine the extent to which they will generalise to perpetrators with varying degrees of conformity to gender stereotypes.

Manuscript received 14 January 2009

Manuscript accepted 5 May 2009

First published online 17 June 2009

REFERENCES

- Brilliant, J. (2007). *Lawmaker mugged in CVS parking lot*. Retrieved 30 May 2007 from <http://www.wthr.com/Global/story.asp?s=5914225>
- Cejka, M. A., & Eagly, A. H. (1999). Gender-stereotypic images of occupations correspond to the sex segregation of employment. *Personality and Social Psychology Bulletin*, 25, 413-425.
- Cutler, B. L., & Penrod, D. S. (1988). Improving the reliability of eyewitness identification: Lineup construction and presentation. *Journal of Applied Psychology*, 73, 281-290.
- Cutler, B. L., Penrod, S. D., & Martens, T. K. (1987). The reliability of eyewitness identification: The role of system and estimator variables. *Law and Human Behavior*, 11, 233-258.
- Davies, G. M., Smith, S., & Blincoe, C. (2008). A "weapon focus" effect in children. *Psychology, Crime, and Law*, 14, 19-28.
- Deaux, K., & Lewis, L. L. (1984). Structure of gender stereotypes: Interrelationship among components and gender label. *Journal of Personality and Social Psychology*, 46, 991-1004.

- Deaux, K., Winton, W., Crowley, M., & Lewis, L. L. (1985). Level of categorization and content of gender stereotypes. *Social Cognition*, 3, 145-167.
- Easterbrook, J. A. (1959). The effect of emotion on cue utilisation and the organization of behavior. *Psychological Review*, 66, 183-201.
- Eckes, T. (1994). Features of men, features of women: Assessing stereotypic beliefs about gender subtypes. *British Journal of Social Psychology*, 33, 107-123.
- Federal Bureau of Investigation. (n.d.). *Crime in the United States 2005*. Retrieved 7 January 2009 from http://www.fbi.gov/ucr/cius2007/data/table_42.html
- Gordon, R. D. (2004). Attentional allocation during the perception of scenes. *Journal of Experimental Psychology: Human Perception and Performance*, 30, 760-777.
- Green, S. K., Lightfoot, M. A., Bandy, C., & Buchanan, D. R. (1985). A general model of the attribution process. *Basic and Applied Social Psychology*, 6, 159-179.
- Greenberg, M. S., Westcott, D. R., & Bailey, S. E. (1998). When believing is seeing: The effect of scripts on eyewitness memory. *Law and Human Behavior*, 22, 685-694.
- Henderson, J. M., Weeks, P. A., & Hollingworth, A. (1999). The effects of semantic consistency on eye movements during complex scene viewing. *Journal of Experimental Psychology: Human Perception and Performance*, 25, 210-228.
- Hope, L., & Wright, D. (2006). Beyond unusual? Examining the role of attention in the weapon focus effect. *Applied Cognitive Psychology*, 21, 951-961.
- Kramer, T. H., Buckhout, R., & Eugenio, P. (1990). Weapon focus, arousal, and eyewitness memory: Attention must be paid. *Law and Human Behavior*, 14, 167-184.
- Leichtman, M. D., & Ceci, S. J. (1995). The effects of stereotypes and suggestions on preschoolers' reports. *Developmental Psychology*, 31, 568-578.
- Loftus, E. F., Loftus, G. R., & Messo, J. (1987). Some facts about "weapon focus". *Law and Human Behavior*, 11, 55-62.
- Loftus, G. R., & Mackworth, N. H. (1978). Cognitive determinants of fixation location during picture viewing. *Journal of Experimental Psychology: Human Perception and Performance*, 4, 565-572.
- Maass, A., & Köhnken, G. (1989). Eyewitness identification: Simulating the "weapon effect". *Law and Human Behavior*, 13, 397-308.
- MacLin, M. K., & Herrera, V. (2006). The criminal stereotype. *North American Journal of Psychology*, 8, 197-208.
- Madriz, E. (1997). Images of criminals and victims: A study on women's fear and social control. *Gender & Society*, 11, 342-356.
- Miguelles, M., & García-Bajos, E. (2004). Esto es un atraco! Sesgos de la tipicidad en la memoria de testigos. *Estudios de Psicología*, 25, 331-342.
- Mitchell, K. J., Livosky, M., & Mather, M. (1998). The weapon focus effect revisited: The role of novelty. *Legal and Criminological Psychology*, 3, 287-303.
- O'Rourke, T. E., Penrod, S. D., Cutler, B. L., & Stuve, T. E. (1989). The external validity of eyewitness identification research: Generalizing across subject populations. *Law and Human Behavior*, 13, 385-395.
- Pickel, K. L. (1998). Unusualness and threat as possible causes of "weapon focus". *Memory*, 6, 277-295.
- Pickel, K. L. (1999). The influence of context on the "weapon focus" effect. *Law and Human Behavior*, 23, 299-311.
- Pickel, K. L., Narter, D. B., Jameson, M. M., & Lenhardt, T. T. (2008). The weapon focus effect in child eyewitnesses. *Psychology, Crime, and Law*, 14, 61-72.
- Pickel, K. L., Ross, S. J., & Truelove, R. S. (2006). Do weapons automatically capture attention? *Applied Cognitive Psychology*, 20, 871-893.
- Shaw, J. I., & Skolnick, P. (1994). Sex differences, weapon focus, and eyewitness reliability. *The Journal of Social Psychology*, 134, 413-420.
- Shaw, J. I., & Skolnick, P. (1999). Weapon focus and gender differences in eyewitness accuracy: Arousal versus salience. *Journal of Applied Social Psychology*, 29, 2328-2341.
- Steblay, N. M. (1992). A meta-analytic review of the weapon focus effect. *Law and Human Behavior*, 16, 413-424.
- Tooley, V., Brigham, J. C., Maass, A., & Bothwell, R. K. (1987). Facial recognition: Weapon effect and attentional focus. *Journal of Applied Social Psychology*, 17, 845-859.
- Vonk, R., & Ashmore, R. D. (2003). Thinking about gender types: Cognitive organization of female and male types. *British Journal of Social Psychology*, 42, 257-280.
- Wells, G. L. (1978). Applied eyewitness testimony research: System variables and estimator variables. *Journal of Personality and Social Psychology*, 36, 1546-1557.
- Williams, J. E., & Best, D. L. (1990). *Sex and psyche: Gender and self viewed cross-culturally*. Newberry Park, CA: Sage.