

Weapon focus and inattentional blindness



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The aim of this research is to investigate the effects of weapon focus and inattention blindness on eyewitness memory. 91 participants were randomly assigned to one of six conditions. Participants performed one of three tasks; count the number of bags (consistent attentional set), count the number of people in white coloured tops (inconsistent attentional set), or count nothing (control), while watching a video depicting a theft consisting of presence or absence of weapon. Participants then completed a questionnaire. The results obtained reveal that there was a main effect of weapon focus on eyewitness memory. However, no significant results were found for the main effect of inattention blindness and the interaction effect of weapon focus and inattention blindness on eyewitness memory.

The Effects of Weapon Focus and Inattention Blindness on Eyewitness Memory

Despite the advances in technology in forensic sciences, eyewitness testimony is still widely used as evidence in court trials to both recall the events occurred and to identify the perpetrator. Evidently, eyewitness testimony has a crucial impact on juror's decision making. However, unintentional errors concerning identification of the perpetrator tends to occur. Therefore, several studies have been conducted to study the factors that may impair eyewitness memory. The current study aimed to investigate the effects of weapon focus and inattention blindness on eyewitness memory as doing so may yield results that are more applicable to real-life situations whereby witnesses are not completely attentive to the event that occurs or on the perpetrator, hence affecting their memory for it.

Crimes involving weapons are on the rise. There has been conflicting arguments in this field of research as some studies suggested that violent conditions such as weapons is associated with emotional arousal that may benefit memory, however, experts in the area favoured the notion that scenarios involving the presence of weapons negative affects eyewitness performance. This phenomenon is known as the weapon focus effect.

Weapon focus effect is defined as the attention focused on a weapon in an event which in turn results in the reduction of attention directed towards other details (Saunders).

According to Easterbrook (1959), weapon focus effect can be explained using cue-utilisation theory which states that upon detecting the presence of a weapon, witnesses experience increased anxiety which will then restrict and focus their attention to the weapon instead of the perpetrator (Easterbrook). Weapons illicit high levels of stress and emotions as weapons are perceived as dangerous. Thus, according to Easterbrook, the heightened emotional arousal leads to a decrease in attentional capacity; a decrease in the variety of cues from the stimulus (weapon) and its environment to which the individual is present in. Specifically, an individual's attention will be restricted and focused on the central information of the stimulus (weapon) at the expense of peripheral; minor, information (perpetrator's features). Therefore, information or cues central to the source of the emotional arousal (weapon) will be encoded while peripheral information or cues will not.

Or does this sound better? Or should I rewrite it based on both contents?

As arousal increases, the number of perceptual cues utilized decreases. This reduction begins with peripheral cues at a lower level of arousal and later if arousal increases it will affect central cues. At an optimum arousal level, when utilization of peripheral cues is minimized allowing total attention to be paid to central cues, performance on a central task could actually improve. In accord with this theory, it follows that weapon focus effect occurs because in a crime situation, the weapon becomes the central cue the criminals' characteristics becomes a peripheral cues and as arousal increases encoding of the peripheral cues decreases. Perceptual narrowing occurs, focus on the gun instead of perpetrators' characteristics

It is argued that witnesses would consider weapons as the central cue because witnesses would consider information pertaining to questions such as, ' Is it about to be utilized?' and ' Is it aimed at me?' (Kramer et al., 1990, as cited in Pickel,). This view has also been supported by Christianson (1992) who found that emotional arousal leads to narrowing of attention such that attention is directed to central details, at the expense of peripheral information. This is supported by studies that measures eye fixation patterns that reflects visual attention. Studies in this area suggests that emotional scenes elicit longer fixation durations on central cues. It was also found that central details of the scenes were better retained as compared to peripheral details.

Loftus, Loftus, and Messo (1987) demonstrated a classic example of the weapon focus effect. In this experiment, 36 participants viewed a series of 18 slides depicting customers ordering food at a fast-food outlet. Participants in the controlled group viewed a customer handing the cashier a cheque for

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the purchase made followed by the cashier returning some change.

Meanwhile, participants in the experimental group viewed a customer pulling out a gun followed by the cashier handing the customer some money.

Participants' eye movements were recorded using a corneal reflection device that delivers a television picture of the scenes observed by the participants combined with a spot light that moves in accordance with participants' eye movements. Participants were also asked to answer a short questionnaire and to identify the target man from a selection of 12 photographs. Results from this experiment revealed that participants in the weapon condition spent a considerable large amount of time fixating on the gun as compared to participants in the control condition; did not fixate much attention on the check. Results from the memory questionnaire and line up test show that participants in the weapon condition scored lower than participants in the control condition. Therefore, results from the eye movement data indicates that weapons distract participant's attention from other important cues thus affecting their ability to identify the perpetrator. However, although significant results were found, one should be cautious with the results as participants in both conditions were exposed to relatively two different scenarios whereby not only was there a manipulation of the presence and absence of weapons, there was also a manipulation of presence and absence of a violent crime. Therefore, the dependent variable may have not likely measured the same thing.

Easterbrook's cue-utilisation hypothesis has also been supported by an abundance of literature in the area. For instance, Pickel, Ross, & Truelove (2006) looked at whether weapons have an effect in capturing attention. 230

participants were randomly assigned into one of four conditions whereby they were told they would be watching a staged scene. Participants in the experimental groups were given a talk on the weapon focus effect while participants in the control groups were given a talk on eyewitness confidence. A minute after the lecture, an actor entered the classroom demanding to see a professor who had awarded him a failing grade while holding either a book (neutral object) or a gun (weapon). Participants then completed two forms; Thayer's (1989) Activation-Deactivation Adjective Check List Short Form and a questionnaire testing participants' memory of the scene. Results revealed that participants who were introduced to a neutral object scored better in the memory test as compared to the participants who were exposed to a weapon which provides support for Easterbrook's cue-utilisation hypothesis (Pickel et al.). This study further found that participants exposed to the lecture on the effect of weapon focus had a better memory score as compared to participants exposed to the lecture on eyewitness credibility. This finding suggests that the weapon focus effect can be overcome if it is made known to individuals.

Besides that, Hope & Wright (2007) examined the effects of weapon on attention. Participants in this experiment viewed a slideshow consisting of 13 pictures of a simulated event of a man in a grocery store. In one of the slides, the perpetrator is seen withdrawing either a gun (weapon condition), a colourful feather duster (unusual condition) or a wallet (control condition). Participants then completed a 20 minute filler task before completing a questionnaire that measured the memory of the event. Data collected revealed that participants exposed to the weapon condition had a lower

accuracy regarding the perpetrator's physical characteristics but had a higher accuracy in recognizing the weapon (Hope & Wright). This finding suggests that individuals tend to fixate their attention on weapons instead of the perpetrator and thus affecting their ability to identify the perpetrator which is crucial in courtrooms.

In addition to Hope & Wright's results, Pickel (2009) investigated the effects of weapon on memory. In this experiment, 127 participants were shown a video depicting a perpetrator robbing two victims; a male and female, while holding either CD (neutral object) or a gun (weapon). Upon watching the video, participants completed a questionnaire which tested their memory of the perpetrator's physical appearance. Results obtained show that participants in the weapon condition scored lower in recalling the perpetrator's physical appearance (Pickel). This finding also supports the cue-utilisation hypothesis introduced by Easterbrook (1959) and provides evidence that weapons may impair an individual's ability to recall the eyewitness event.

Maass and Kohnken (1989) conducted a study to investigate the weapon focus effect on witness recall and recognition. Their experiment differed from other research in the area that used pictures or movies to depict an eyewitness event as they used a syringe as a weapon simulation that is perceived as harm to participants. 86 students were recruited for this study. A false questionnaire regarding mood and health behaviour was first administered to the subjects. Upon completion, subjects were led into a room whereby a female confederate approached them while holding either a syringe partially filled with a yellow liquid or a pen. Participants then

completed the same mood scale and a couple of filler tasks for 20 minutes. Following that, participants completed a recognition and recall task. The recognition task involved identifying the target (female confederate) from a lineup of seven people while the recall task involved answering a questionnaire that accessed participants' recall of target's facial features. Results from the study revealed that participants exposed to the syringe performed more poorly on the recall and recognition task as compared to participants exposed to the pen.

Moreover, Steblay (1992) conducted a meta-analysis review on several weapon focus effect studies. 19 studies were reviewed that hypothesised that weapons negative affects witness's ability in identifying criminals. Results from the meta-analysis revealed that there is a difference in presence and absence of weapon conditions, with presence of weapons in a crime leading to a reduced accuracy in indentifying perpetrators of a crime.

In a recent study by Mitchell, Livosky, and Mather (2011), the findings of the effect of weapons on eyewitness memory was replicated. 83 participants were randomly assigned into one of four conditions whereby each of them viewed a video of a business exchange between two males whereby one of them is seen pulling out either his bare hand (control), a stalk of celery (unusual), or a handgun (weapon) from a briefcase. Shortly after, the participants completed a memory questionnaire. Results obtained reveal a classic weapon focus effect whereby participants in the weapon conditioned scored lower than participants in the control and unusual condition.

Besides exploring the effects of weapon focus, this research also aimed to look at inattention blindness which was first coined by Mack & Rock (1998). They defined inattention blindness as a failure to perceive an unexpected stimulus as attention is devoted on another task or object (Mack & Rock). Individuals tend to fail to perceive everything detail of the environment at all times, even though there appears to be no apparent factors that hampers their vision. In some situations, the consequences are trivial. For instance, Simon and Chabris (1999) found that individuals who were focused on finding their seats in a crowded cinema often did not notice their friends waving their arms at them, trying to obtain their attention. However, sometimes the consequences may be deadly. For instance, in an experiment, pilots were asked to operate a flight simulator whereby the flight console instruction was projected onto the windshield of the cockpit. It was assumed that this would have decreased errors as the pilots would be viewing both the console information as well as the external world at the same time. The results from this study was truly shocking. Some of the pilots tried to land the airplane as requested by the console information although another airplane was obstructing the runway. When questioned, the pilots reported not being aware of the obstruction; they did see an airplane on the runway despite looking at it directly.

To better understand the factors that are involved in focusing attention to an unexpected stimulus, Neisser (1979, as cited in Rivordo et al., 2011) introduced a perceptual cycle framework which accounted for attention capture and capture of awareness. Typically, Neisser studied stimulus properties that would influence the likelihood of an individual noticing an

unexpected object or event (bottom-up processing) as well as the processes that is under the control of the observer which influenced what they notice (top-down processing). Thus, through his efforts, it has been found that unexpected stimulus alone and distinctiveness of the unexpected stimulus do not capture awareness. Further research in the area has found that a stimulus is more likely to capture awareness if it is consistent with the attentional set. An attentional set is defined as devoting attention to a particular characteristic of a stimuli (Rivordo et al., 2011). Therefore, the likelihood of noticing the unexpected stimulus increases if it shares similar perceptual features with the primary task. It has been found that when individuals adopt a attentional set, they adopt a top-down processing which overrides the individual's ability to capture other available information. In a typical inattention blindness study, an attentional set is established by providing instructions for a primary task. In regards to the current study, the primary task will be counting a stimulus while the secondary task will be watching the video shown.

Neisser's theory was put to test by Most et al. (2001) that is based on a study by Mack and Rock (1998). In their study, 128 participants were recruited. Participants were exposed to a computer programme whereby four white and four black T and L shapes moved independently and randomly. As the objects moved, they would collide with one another and bounce off the edges of the screen. Participants were asked to fixate their attention to a central point in the middle of the screen but were asked to keep tally of the number of times the objects (either white or black T and L shapes) bounced off the edges of the screen. Participants completed five trials. The first and

second trial did not introduce any unexpected stimulus. In the third trial, a cross shape, either white or black in colour appeared from the left of the screen and moved horizontally towards to the right of the screen. Participants were then given a questionnaire that asked if they had seen anything unusual and provide details of the object. Following that, participants completed a fourth trial whereby the cross appeared once again. They then completed the same questionnaire. In the fifth trial, participants were asked to fixate their attention on the centre point of the screen and not to keep track of the bounces (full attention). Finally, they completed the same questionnaire. Results revealed that when the unexpected object (cross) was similar to the attended objects, a greater number of participants noticed the stimulus. Specifically, 94 percent of participants who attended to the white coloured shapes noticed the cross when it was white while only six percent of participants in the same condition noticed the cross when it was black. Similar findings were found for participants who attended to the black coloured shapes; 94 percent noticed when the cross was black, while none of the participants noticed when it was white in colour (Most et al.). In a second part to their study, 32 participants were recruited. The materials and procedures used were identical to those in the first experiment. However, instead of attending to T and L shapes, circles and squares were used and instead of a black cross, the unexpected object was a red cross. Thus, it differed in shape and colour. Results from this study reveal that about 30 percent of participants failed to notice the unexpected object. Therefore, results from both studies supports Neisser's perceptual cycle framework that states that distinctiveness alone cannot account for attentional capture,

instead, it is the similarity between the unexpected stimulus to other objects present that influences attentional capture.

Once Neisser's theory has been established and supported, Simon & Chabris (1999) conducted an experiment to examine the role of an attentional set in inattention blindness. 228 participants were recruited for this study. They were asked to watch a video of two teams consisting of three players playing a game of basketball; one team in white t-shirts, another team in black t-shirt. Participants were told keep tally of the number of passes made by either the white or black team. Halfway through the video, participants were exposed to either one of two unexpected events. In one condition, a woman holding carrying an umbrella walked from the left corner of the area to the right and disappearing off screen. Meanwhile, in the second condition, a woman in a gorilla costume is seen walking in the same direction; from the left to the right. After the video was played, participants were asked to write down their counts on a piece of paper followed by completing a surprise questionnaire that questioned if they had noticed anything unusual. Overall, it was found that only 54 percent of participants noticed the unexpected event.

Specifically, the results revealed that participants who counted the number of passes of the black team (primary task) noticed the black Gorilla more; (consistent attentional set in regards to colour of team to colour of the Gorilla costume) while participants who were asked to observe the actions of the white team hardly noticed the black Gorilla (inconsistent attentional set). In contrast, there was little difference in participants who were exposed to the woman with an umbrella. This could be attributed to the fact that the Gorilla was black in colour whereas the lady with an umbrella was dressed in

pale colours. Thus, their findings reveal individuals are more likely to notice an unexpected stimulus if it shares similar features, in this case, colour of the gorilla with the colour of the team (Simon & Chabris).

Besides that, Hyman et al. (2010) examined the effects of inattention blindness while walking. 151 individuals were observed by two observers who were positioned at both ends of a walkway. Out of the 151 participants, 78 individuals were without any electronic device, 24 individuals were using their phones, 27 individuals were using their music player while the remaining 22 individuals were walking in pairs and engaging in a conversation. A brightly coloured dressed unicycling clown was placed somewhere in the middle of the walkway. At the end of the walkway, participants were asked if they had seen anything unusual and to describe it if answered yes. Participants who answered no were specifically asked if they had seen the unicycling clown. Results from their study revealed that participants who were on their cell phones were less likely to notice an unexpected stimulus; a unicycling clown, while walking. Specifically, 75 percent of individuals were inattentionally blind to the unicycling clown while 51 percent of individuals without electronic device, 61 percent of individuals with a music player, and 71 percent of individuals in pairs noticed the unicycling clown (Hyman et al.). This finding reveals that an unexpected stimulus can pass an individual's visual field if attention is focused on another task. Although it could be argued that the cell phone users were less likely to pay attention to their surroundings, Strayer et al., (2003, as cited in Hyman et al.,) found that mobile phone users were as likely to look at objects while in a driving simulation, but were less likely to remember the

objects when compared to individuals not engaged in another task.

Moreover, although this study did not study the influence of attentional sets in capture of attention, it provides substantial evidence for the occurrence of inattentional blindness in daily life.

Furthermore, Karns & Rivardo (2010) investigated the role of attentional set in inattentional blindness. 86 participants were randomly assigned to one of two scenarios (family emergency or restraining order) and also to one of two unexpected situations (family confrontation or gorilla). Participants were exposed to 4 videos that were shown on a single screen. The top left and bottom right quadrant contained distracter videos of the lobby of a dormitory. The top right quadrant contained a video of a target person walking through the student lounge while the bottom left quadrant contained the unexpected event. Every participant was exposed to the same videos except for the unexpected event. Half of the participants were exposed to a confrontation between two individuals near a staircase while the remaining half of the participants were exposed a man clad in a gorilla costume walking down the same staircase. Participants in the restraining order scenario were provided with a picture and physical description pertaining to a target individual who has a restraining order against him and was no longer allowed to be on campus. On the other hand, participants in the family emergency scenario were provided with the same picture and physical description. However, they were informed that the target's family was looking for him due to a emergency. Following that, participants were informed to act a security officers and be on the lookout for the target person. They participants were instructed to pause the video upon identifying the target

individual. Finally, participants were asked to completed a questionnaire that inquired if they had seen anything unusual on campus. The results obtained shows that consistent attentional set increases the probability of noticing the unexpected stimulus; participants in the family emergency condition were more likely to notice the gorilla (71 percent) than the confrontation scene (33 percent) while participants in the restraining order condition was more likely to notice the confrontation (77 percent) rather than the gorilla (40 percent) (Karns & Rivardo). This finding reveals that an attentional set that is consistent with the content of the event will reduce inattentional blindness.

A recent study by Chabris, Weinberger, Fontaine and Simons (2011) simulated a incident that occurred in Boston whereby a policemen on a chase ran past an assault but claimed to not have noticed it. This study was a first attempt to study inattentional blindness in real-world events. In the first part of the experiment, 20 students were recruited and tested individually. Each participant was asked to chase a male confederate for 400 meters during night time. Participants were asked to maintain a distance of at least 9 meters while keeping count of the number of times the confederate touched his head. About 125 meters into the chase, about eight meters away from the two runners, two male confederates were beating up another male confederate. At the end of the chase, the experimenters asked the participants if they had witness anything unusual along their pursuit. Results from their study revealed that only 35 percent of participants noticed the fight. This findings suggests that inattentional blindness is applicable to real life situations. However, one could argue that it was due to the darkness that participants failed to notice the fight. Therefore, the experimenters

replicated the study by repeated the same procedure but held the chase during daytime on. Results from the second study reveal that only 56 percent of participants noticed the fight, thus providing evidence that inattention blindness still persists. Once again, although this study did not integrate the effects of attentional sets in noticing an unexpected stimulus, compared to the study by ?, this study manipulated the participants' task (asked to count the number of touches to the head). Meanwhile, the study by ? merely manipulated the unexpected stimulus while the primary task of participants were not manipulated.

Another study by Lane (2006) investigated the effects of engaging in two task simultaneously on memory. In his study, 144 participants were randomly assigned into two groups. Participants in both groups were asked to watch a slideshow of a scenario whereby a man is seen entering a office, repairs a chair and finally stealing some money and a calculator. Participants in the first group were asked to watch the slideshow while listening to some songs. They were further instructed that the tape would be stopped at any given time, and when that happens, they were to state the title or artist of the last two songs. Following that, participants completed a music recognition test. Then, participants completed a word search puzzle before answering a memory questionnaire. Meanwhile, participants in the second group were asked to first view the slideshow before listening to the songs. Following that, participants completed the memory questionnaire before completing the music recognition task. Results from this study disclosed that participants who were asked to participate in two task simultaneously

displayed poorer memory scores for the eyewitness event than participants who completed both task separately.

Although there has been extensive research on both inattention blindness and eyewitness memory separately, there appears to be little integration between them. To date, there is only one study that integrated both these areas. Rivardo et al. (2011) conducted a study to examine how attentional set is able to influence inattention blindness for a simulated eyewitness incident and the consequent memory for it. 187 students were randomly assigned into one of three attentional sets condition; consistent attention set (count the number of individuals with and without shopping bags), inconsistent attentional set (count the number of individuals in wearing and not wearing blue shirts), and control condition (count nothing). The attentional set in this experiment was manipulate according to the similarity between the primary task (what to count) and the critical item (shopping bag stolen). At the start of the experiment, participants were given a word list to memorize. After that, a video of a theft of a shopping bag that occurred in a mall was shown. While the video was shown, participants completed the task they were assigned to according to the attentional set conditions they were in. After the video was shown, participants wrote down their tallies on a piece of paper followed by writing down as many of the words they remembered from the word list. Finally, participants completed a questionnaire based on the video. Results from this study revealed that participants in the consistent attentional set condition (count the number of bags) were more likely to notice the theft of a shopping bag as compared to participants in the inconsistent attentional set (count number of shoppers in

blue t-shirts). Subsequently, participants who were inattentionally blind to the theft showed low accuracy in reporting details of the theft (Rivardo et al.).

Considering the studies conducted on both weapon focus and inattention blindness, the current study raised the question: what are the effects of weapon focus and inattention blindness on eyewitness memory? This area of research was chosen as little efforts have been made to incorporate these two fields of research. Moreover, the phenomena of inattention blindness is more reflective of an actual eyewitness event as witnesses are more likely to be occupied with another activity or task such as shopping, driving, and talking to another person during the event.

There are three hypotheses. Firstly, it was predicted that participants in the weapon condition will have lower accuracy of eyewitness memory. This hypothesis is in line with research conducted by Pickel et al. (2006), Hope & Wright (2007), and Pickel (2009). Secondly, it was hypothesized that participants in the consistent attentional set condition are more likely to notice the theft compared to participants in the inconsistent attentional set condition and thus are more likely to have a better accuracy of the eyewitness event. This hypothesis is consistent with the research by Karns & Rivardo (2010) and Rivardo et al. (2011). Lastly, I hypothesized that participants exposed to the presence of a weapon combined with a consistent attentional set will produce higher accuracy regarding the eyewitness event. I hypothesized that the interaction effect will have completely opposite results in comparison to the main effect of weapon focus as a research conducted by Kane (2012) found that when weapons

were present, the changes to the scenes were detected significantly faster compared to scenes with an absence of weapons and thus having an effect on memory of the event. Therefore, I hope to find similar results in this proposed research by incorporating inattention blindness instead of change blindness. Although it can be argued that both change blindness and inattention blindness are two different phenomenon, there appears to be one crucial similarity between the two of them. Both inattention blindness and change blindness involves a failure in reporting a visual stimuli that is otherwise quite visible. Therefore, it has been found that focused attention is necessary for both phenomenon's to be overcome.

There are a couple of implications of conducting this study. If significant results are found, inattention blindness may reduce the number of unreliable witnesses. This is possible as in an actual eyewitness event, witnesses are usually engaging in another task and this research attempted to create a simulated eyewitness event in a laboratory study by including a primary task. Therefore, the findings obtained can be used to improve eyewitness testimony in a courtroom. This can be done by merely asking the witnesses what they were doing while the event occurred. Upon knowing that the witnesses were concentrating on a primary task, the jury would be able to make better decisions by dismissing the accounts of eyewitnesses and focusing more on evidence. Besides that, there also appears to be a theoretical and practical implication to this study. Theoretically, further research can be conducted to investigate if both the phenomenon's of weapon focus and inattention blindness are automatic or controlled processing. If it is a controlled processing, the practical implication that

arises is that individuals who are more likely to observe a crime committed by an armed criminal, for example a bank officer, could perhaps be trained in order to prepare them to perform better as eyewitnesses.