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Some Facts About "Weapon Focus"*

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"Weapon focus" refers to the concentration of a crime witness's attention on a weapon, and the resultant reduction in ability to remember other details of the crime. We examined this phenomenon by presenting subject-witnesses with a series of slides depicting an event in a fast-food restaurant. Half of the subjects saw a customer point a gun at the cashier; the other half saw him hand the cashier a check. In Experiment 1, eye movements were recorded while subjects viewed the slides. Results showed that subjects made more eye fixations on the weapon than on the check, and fixations on the weapon were of a longer duration than fixations on the check. In Experiment 2, the memory of subjects in the weapon condition was poorer than the memory of subjects in the check condition; In Experiment 1 similar, though only marginally significant, performance effects were obtained. These results provide the first direct empirical support for weapon focus.

INTRODUCTION

Psychologists and lawyers refer to a phenomenon called "weapon focus." Weapon focus refers to the concentration of some witness's attention on a weapon—the barrel of a gun or the blade of a knife—during a crime, leaving less attention available for viewing other items. One law professor suggested that attention on a weapon is so concentrated that it causes "the exclusion of everything else" (Taylor, 1982: p. 32). Less extreme is the characterization of the weapon as an object that "appears to capture a good deal of . . . attention, resulting in, among other things, a reduced ability to recall other details from the environment" (Loftus, 1979, p.35).

Many researchers in the field of eyewitness testimony appear to take the existence of weapon focus for granted. Yarmey and Jones (1983) asked psychologists who had published scientific studies on eyewitness testimony in refereed

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journals a number of questions, including one about weapon focus. Nearly 90% of these experts agreed that in a crime situation a victim is likely to focus on a gun, which will interfere with his or her ability to remember the criminal's face. Lay persons, interestingly, are far less likely to agree with this assertion (Yarmey & Jones, 1983; Deffenbacher & Loftus, 1982), but instead believe that victims typically get a good look at both the gun and the face.

Evidence for the existence of weapon focus stems primarily from two sources. In the traditional perception/memory literature, there are numerous experiments in which eye movements have been monitored while people observe complex scenes; it shows that people fixate faster, more often, and for longer durations on unusual or highly informative objects (Antes, 1974; Loftus & Mackworth, 1978). It is generally agreed by eyemovement researchers that eye fixation data provide a valid measure of where in a scene and to what an individual is attending.

A second source of evidence stems from the eyewitness testimony literature, where a single study exists that provides only weak support for weapon focus (Johnson & Scott, 1976). In this study, unsuspecting subjects sat outside an experimental laboratory waiting to participate in an experiment. A receptionist was there briefly and then left on some pretext. While waiting, subjects in the "no weapon" condition overheard an innocuous conversation about an equipment failure, saw a target individual enter the room holding a grease pen, watched him utter a single line and leave. In the "weapon" condition, subjects overheard a hostile conversation along with crashing objects, saw a target individual enter the room holding a bloodied letter opener, watched him utter a single line and leave. In both conditions, the target individual was viewed for four seconds. Subjects were later tested on their memory for the event. Nearly every subject in the weapon phase described some sort of weapon, whereas very few of the subjects in the no-weapon phase described the comparable item. Moreover, the presence of the weapon was associated with a reduced ability to identify the target individual from a set of fifty photographs shown later (49% versus 33% correct identifications).

Unfortunately, as Loftus (1979) and McCloskey and Egeth (1983) have noted, this study is far from a perfect test of the effects of the presence of a weapon because the two conditions of the experiment differed in so many ways besides the presence or absence of the weapon. In one condition, the target's hands were bloodied while in the other they were full of grease; in one a hostile conversation preceded the target's entrance into the reception room whereas in the other the conversation was innocuous; the statements uttered by the target in the presence of the subject were also different. Thus, although this study is suggestive in terms of providing evidence for the phenomenon of weapon focus, it is far from conclusive.

Efforts to demonstrate weapon focus could profit from an application of the sophisticated methodology used in picture memory experiments to the more ecologically valid eyewitness testimony paradigm. A study that examined the eye movements of individuals who watched a scene that did or did not contain a weapon could reveal whether the weapon captures more attention since the

number and duration of eye fixations could be monitored and analyzed. Any consequences of the presence of a weapon for later recollection of other details could be measured. The purpose of the present research was to apply this methodology to an eyewitness situation, in hopes of assessing whether support for weapon focus could be obtained. Subjects in Experiment 1 viewed a series of slides in which a customer goes through a cafeteria line in a fast-food restaurant. In one version the customer points a gun at the cashier and she hands him some money. In a second version, the customer hands the cashier a check and she returns some money. The slides are identical except for the presence of a weapon in one case and a check in the other. Eye movements were recorded during the viewing of the slides. If viable, the concept of weapon focus suggests that subjects in the weapon condition should fixate more often and for longer durations on the weapon than the check. A poorer memory for other details in the scene could result.

EXPERIMENT 1

Method

Subjects

The subjects were 36 students at the University of Washington who ranged in age from 18 to 31 years old. Approximately half of the subjects were recruited through an advertisement posted in two dormitories on campus and were paid $3.50 for their participation. The remainder participated in exchange for extra credit in psychology classes. No differences in the performance of these two groups of subjects were found, and thus they were treated as a single group of subjects.

Stimuli

The stimuli were two series of 35-mm slides. The 18 slides in each series depicted people moving through the order line of a Taco Time restaurant. In the control series, the second person through the line (person B) hands the cashier a check to pay for a purchase. The cashier returns some money to person B. In the weapon series, person B pulls a gun on the cashier and she hands him some money. The two slide series were virtually identical, then, except in one version there is a weapon and in the other a check. The weapon/check appeared in four of the slides.

Apparatus

The slides were displayed via a Kodak carousel projector with a tachistoscopic shutter. Eye movements were recorded using a corneal reflection device described by Loftus and Mackworth (1978). This device yields a television picture of the scene being observed by the subject, superimposed over which is a

spot of light that moves about the scene in accordance with where the subject fixates. The eye movement data thus obtained were recorded on videotape.

Design and Procedure

The slides were shown, one by one, for 1.5 sec apiece. Subjects were told that the purpose of the experiment was "to test a theory known as proactive interference." The subjects were then told that they would be seeing two series of slides and that they were going to be tested only on the second series. They were instructed to view the first series of slides normally, while their eye movements were recorded.

During a 15-min retention interval subjects viewed a filler series of slides and wrote a detailed description of those slides. The retention interval was followed by a 20-item multiple-choice questionnaire. Each item was accompanied by four alternatives, one of which was correct. Seven of the items pertained to person B, for example "What was the color of B's coat?" to which the subjects could choose from blue, brown (the correct answer), black, or gray. Other questions pertained to miscellaneous details such as the item that person A bought (a soft drink), the name of the restaurant (Taco Time), and the object worn by the woman who went through the line (a scarf).

Subjects also were given a lineup test: 12 photos were presented in a random 3×4 pattern, and the subjects attempted to identify person B. They also gave a confidence rating on a scale from 1 to 6, with 1 representing guessing and 6 representing "very sure."

We used a 12-person photospread to reduce the probability of a correct recognition based upon change factors alone. The 12 photos were head and shoulder frontal-view photographs of individuals selected to be similar to the target person (B). The responses of 72 undergraduates were used to compute the functional size of the photospread (Wells, Leippe, & Ostrom, 1979). Each subject received a description of the target person, and then attempted to select the individual from the set of 12 photos. The functional size was computed to be 10.29, indicating that the lineup possessed a high degree of fairness.

Results

Questionnaire Data

Subjects in the weapon condition were only slightly, but not significantly, less accurate than controls on the 20-item questionnaire. Weapon subjects were correct on 45.8% of the items, while control subjects were correct on 50.3% of the items, $t(34) = 1.37$, SE = 3.25, $.10 > p > .05$, one tailed.

On the seven questions that pertained to person B, a similar pattern emerged. Again relative to the controls, subjects in the weapon condition were only slightly, but not significantly, less accurate than controls. Weapon subjects were correct on 45.5% of the items, while control subjects were correct on 51.1% of the items, $t(34) = 1.03$, SE = 5.38, $p > .10$.

There were two questions that no subject missed: they concerned the object that person B held in his hand, and the color of that object. This is consistent in part, and in contrast in part, to the Johnson and Scott finding that subjects in the "weapon" condition accurately described the weapon, but those in the control condition rarely described the comparable item.

Lineup Data

Subjects were shown a 12-person photo-lineup; thus chance performance was 8.5%. Virtually all errors were false alarms, rather than failures to choose someone. Only one subject (in the weapon condition) failed to choose someone. Seven of the control subjects chose the correct person (38.9%); only two of the weapon subjects did so (11.1%). This difference was marginally significant, $\chi^2(1) = 3.71$, $.06 > p > .05$.

Despite the fact that the control subjects were over three times more likely to be correct than weapon subjects, the two groups did not differ in terms of confidence level. Mean confidence for the weapon subjects was slightly higher than for the control subjects (3.67 versus 3.33), but this difference was not significant, $t(34) = .86$, SE = .39, $p > .30$.

We calculated the relationship between confidence and accuracy within weapon/check conditions, although statistical analyses were not performed since so few subjects were correct in the weapon condition. In the weapon condition, the two correct subjects had a mean confidence of 2.0, while incorrect subjects had a mean confidence of 3.86. In the check condition, the seven correct subjects had a mean confidence of 3.57, while the remaining incorrect subjects had a mean confidence 3.18.

Eye Movement Data

To analyze the data, the videotape was played at approximately 1/10 its normal speed. The experimenter viewed the tape, while timing the duration of subjects' fixations on the gun and the check with a stop watch. These values were then corrected to account for the fact that the tape had been slowed for analysis purposes. Using this technique, we obtained the number of fixations made by each subject on the weapon and the check in the slides in which these appeared, as well as the durations of these fixations.

Subjects made more fixations on the gun than the check. The average number of fixations on the gun was 3.72, and on the check it was 2.44, $t(34) = 2.63$, SE = .49, $p < .01$. Moreover the duration of the fixations on the weapon was longer than on the check, 242.0 msec versus 200.3 msec, respectively, $t(34) = 2.24$, SE = 18.63, $p < .025$. In analyzing the duration data, raw scores were not transformed since the data were approximately normally distributed, as is typically the case for eye-movement data (Gould, 1969). None of the other standard reasons for transforming data applied in the present case (e.g., see Smith, 1976).

Discussion

The results showed that subjects who viewed a simulated armed robbery spent more time looking at the weapon than control subjects who saw a virtually identical scene involving a check. They made more eye fixations on the gun, and those fixations were of longer duration. One consequence was a reduced ability to recognize the individual holding the weapon, although this effect was only marginally significant. It seemed advisable to replicate the experiment, at least insofar as the memory performance aspects were concerned. Thus, Experiment 2 was conducted.

EXPERIMENT 2

Method

Subjects

The subjects were 80 students at the University of Washington who participated in exchange for extra credit in psychology classes. Since eye-movement data were not collected, these subjects could be run in small groups ranging in size from 4 to 8. Participation in this study actually served as a filler activity for another completely unrelated study.

Materials, Design, Procedure

The same two slide series used in Experiment 1 were used here. Forty subjects saw the weapon version; 40 saw the check version. Subjects saw their respective series displayed at a rate of 1.5 sec per slide under the guise that they were participating in an experiment on proactive interference. After a 15-min retention interval, they were given a seven-item multiple choice test of items that pertained to person B. They were also given the 12-person lineup test in which they attempted to identify person B.

Results

On the seven questions that pertained to person B, subjects in the weapon condition were less accurate than controls. Weapon subjects were correct on 56% of the items while control subjects were correct on 67% of the items, $t(78) = 2.04$, $p < .05$.

On the 12-person lineup test, chance performance was 8.5%. Again, subjects in the weapon condition were less accurate than controls. Weapon subjects were correct only 15% of the time, while control subjects were correct 35% of the time, $\chi^2(1) = 4.27$, $p < .05$. All errors were false alarms.

GENERAL DISCUSSION

Taken together, the present experiments provides the first real support for the viability of the concept of "weapon focus." In the first experiment, subjects who viewed a simulated armed robbery spent more time looking at the weapon than control subjects who saw a virtually identical scene involving a check. They made more eye fixations on the gun, and those fixations were of longer duration. One consequence was a reduced ability to recognize the individual holding the weapon. In the second experiment, subjects who saw the event containing a weapon were not only less likely than controls to accurately identify the perpetrator, but they were less accurate when they answered specific questions about him.

The general idea that subject-witnesses might perform more poorly in the weapon condition than in the control condition raises a question about which specific items should suffer this decrement in performance. Performance on questions that pertain to the target person B (e.g., What is the best description of B's hair?) was affected by the presence of the weapon (in Experiment 2, although not significantly so in Experiment 1). Performance on items seen prior to the appearance of person B (e.g., What did the sign below the clock say?) were not significantly influenced, although there was a slight tendency for weapon subjects to be correct less often. One interpretation of these findings is that the presence of the weapon has the largest effect on items appearing in the same slides as the weapon appears. Further experimentation is needed to explicitly determine whether the detrimental effect occurs for items that do not pertain to the target person, but that also appear in the same slides as the weapon.

Why does a weapon lower the memory performance of an eyewitness? In a real-life crime situation, "weapon focus" would presumably be inextricably interwoven with high arousal caused by the crime itself and intensified by the presence of a weapon. The high stress itself could be expected to lead to a narrowing of the range of perceptual focus, as Easterbrook (1959) has noted. In the present experimental simulation, we have shown that such narrowing of perceptual focus can occur in response to a weapon, even when the events are not particularly stressful. While no measures of arousal were obtained in this experiment, it is likely that the level of stress did not remotely approach that expected in a real crime situation.

It should probably be mentioned that the tendency for subjects to fixate on a weapon (as opposed to a less threatening object such as a check), may simply reflect a tendency to fixate on any unusual object. Had we included a condition in which the customer pulled a banana out of his pocket and pointed it at the cashier, we may have observed an analogous result, namely, more frequent and longer fixations on the banana accompanied by poorer recognition memory for the face of the person holding the banana. Further research may help to clarify whether there is anything special about a weapon above and beyond its unexpected nature.

Further research should also be done to examine the impact of a weapon on

selections from a photospread in which the offender is absent. Only offender-present photospreads were used in the current studies. As Malpass and Devine (1984) have noted, the rate of correct identifications in an offender-present lineup cannot tell us about the rate of false identifications when the offender is absent. Perhaps, relative to controls, the subjects who saw a weapon would be less likely to choose anyone in a target-absent lineup. Such a result, while only speculative, would be comforting in that it would suggest that the error of identifying an innocent suspect is not increased by the presence of a weapon.

REFERENCES

Antes, J. R. (1974). The time course of picture viewing. *Journal of Experimental Psychology, 103,* 62–70.

Deffenbacher, K. A., & Loftus, E. F. (1982). Do jurors share a common understanding concerning eyewitness behavior? *Law and Human Behavior, 6,* 15–30.

Easterbrook, J. A. (1959). The effect of emotion on the utilization and organization of behavior. *Psychological Review, 66,* 183–201.

Gould, J. D. (1969). *Eye movements during visual search* (Research report No. RC2680). Yorktown Heights: IBM Thomas J. Watson Research Center.

Johnson, C., & Scott, B. (1976). Eyewitness testimony and suspect identification as a function of arousal, sex of witness, and scheduling of interrogation. Paper presented at the American Psychological Association Annual Meeting, Washington, D.C.

Loftus, E. F. (1979). *Eyewitness testimony.* Cambridge, MA: Harvard University Press.

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.

Malpass, R. S., & Devine, P. G. (1984). Research on suggestion in lineups and photospreads. In Wells, G. L. & Loftus, E. F. (Eds.), *Eyewitness testimony: Psychological perspectives.* Cambridge, MA: Cambridge University Press.

McCloskey, M., & Egeth, H. E. (1983). Eyewitness identification: What can a psychologist tell a jury? *American Psychologist* (May), 550–563.

Smith, J. E. K. (1976). Data transformations in analysis of variance. *Journal of Verbal Learning and Verbal Behavior, 15,* 339–346.

Taylor, L. (1982). *Eyewitness identification.* Charlottesville, VA: The Michie Co.

Wells, G. L., Leippe, M. R., & Ostrom, T. M. (1979). Guidelines for empirically assessing the fairness of a lineup. *Law and Human Behavior, 3,* 285–293.

Yarmey, A. D., & Jones, H. P. T. (1983). Is eyewitness identification a matter of common sense? In S. M. A. Lloyd-Bostock & B. R. Clifford (Eds.), *Evaluating witness evidence.* London: Wiley.