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THE WEAPON FOCUS EFFECT: TESTING AN EXTENSION OF THE UNUSUALNESS HYPOTHESIS

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The weapon focus effect (WFE) occurs when a weapon distracts eyewitnesses, harming memory for the perpetrator and other details. One explanation is that weapons are unusual in most contexts, and unusual objects distract eyewitnesses. We extended this unusualness hypothesis to include typical objects used in a distinctive manner, as criminals often make use of a typical object as a weapon (e.g., tire iron, beer bottle). Undergraduates (N = 963) viewed a video depicting a man with a handgun, distinctive object, typical object and action, or typical object used as a weapon. Only the handgun reduced eyewitness identification accuracy relative to the typical object and action, replicating the WFE. Importantly, participants who reported high confidence after choosing from a lineup tended to be highly accurate, regardless of condition.

Keywords: eyewitness identification, weapon focus effect, unusualness hypothesis, confidence and accuracy

On August 16, 2008, a group of men robbed another group while brandishing a broken bottle (Ratcliffe, 2008). On May 18, 2010, a man was attacked with a tire iron ("City deputies arrest three after fight with tire iron," 2010). More famously, on December 14, 2008, an Iraqi journalist used his shoes as weapons, throwing them separately at President George W. Bush during a news conference in Baghdad ("Iraqi journalist throws shoes at Bush in Baghdad," 2008). Bush ducked away from both shoes, narrowly avoiding being struck in the face. A common thread among these incidents is the use of a typical object as a weapon.

The psychological literature includes several studies on the *weapon focus effect* ([WFE]; e.g., Carlson & Carlson, 2012, 2014; Erickson, Lampinen, & Leding, 2014;

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Hope & Wright, 2007; Loftus, Loftus, & Messo, 1987; see meta-analyses by Steblay, 1992;Fawcett, Russell, Peace, & Christie, 2013). A common finding is that eyewitness memory is worse for crimes in which a weapon was present. The leading explanation for the WFE is the unusualness hypothesis, such that when an unusual or unexpected object is present, eyewitness memory becomes worse for other details, including the perpetrator's appearance (e.g., Mitchell, Livosky, & Mather, 1998; Pickel, 1998, 1999). This hypothesis is derived from the basic attention literature showing that non-distinctive objects draw less attention than distinctive objects (Antes, 1974; Loftus & Mackworth, 1978). The distraction created by a distinctive or unexpected object reduces the amount of attention devoted to other elements of the crime, including the perpetrator's face. The result is worse eyewitness recall of details from the crime and, less consistently, lower eyewitness identification accuracy (e.g., Fawcett et al., 2013).

No studies have investigated the possibility that a WFE also could result from a crime involving a typical object used in an unusual manner (e.g., as a weapon), as in the above examples. Our goal was to conduct the first study to focus on this important issue. This study serves both a theoretical and an applied purpose. First, we tested an extension of the unusualness hypothesis (a typical object used in a distinctive manner), as all studies so far addressing this hypothesis have involved distinctive objects rather than distinctive actions, per se. Second, many real-world crimes are committed with everyday objects used as weapons, and it is important to understand the impact these objects could have on eyewitness memory. Police might expect an eyewitness to have worse memory for the perpetrator if he was using an obvious weapon, but not necessarily if a non-weapon was used instead. Before describing our study, we will bring the reader up to speed on the WFE as typically studied, highlighting tests of the unusualness hypothesis.

The Weapon Focus Effect

Psychological scientists have known for decades that a weapon can distract eyewitnesses, and the majority of those in the criminal justice system have caught on (Desmarais & Read, 2011). Loftus et al. (1987) conducted the first controlled experiments to provide evidence of a WFE. They presented a series of slides to participants in two experiments depicting a man approaching a cashier in a fast-food restaurant. In one version, he hands over a check; in the other, he points a gun at the cashier. Eye-tracker data from the first experiment showed that participants focused more on the gun than the check and less on the man's face in the gun condition. The second experiment found an effect on eyewitness identification, such that the participants who had seen the gun were worse at choosing the man from a lineup compared to those in the check condition.

Several later laboratory experiments replicated the WFE, at least in terms of eyewitness recall. For example, Kramer, Buckhout, & Eugenio (1990) conducted several experiments in which a slide presentation depicted a man walking down a hallway with either a magazine or bloody meat cleaver. When the object was visible for several slides, participants were worse at later recalling details from the slides (other than the central object). Unlike Loftus et al. (1987), they did not find an effect for eyewitness identification, a point to which we return below.

As evidence accumulated in support of the WFE, some researchers turned their attention to testing the unusualness hypothesis (e.g., Hope & Wright, 2007; Mitchell et al., 1998; Pickel, 1998, 1999; Shaw & Skolnick, 1994). Mitchell et al. (1998) presented a video of an interaction between two businessmen, with one of them presenting a gun or a stick of celery. Due to the fact that neither of these objects were expected in the context of the business meeting, both conditions led to lower recall of other aspects of the scene. Pickel (1998) replicated this effect with a raw chicken presented in a hair salon. Importantly, Pickel (1999) extended the unusualness hypothesis by showing that a weapon will not always draw attention; rather, it depends on whether the weapon is unusual given the context. To illustrate, she supported the WFE when a handgun was presented at a sporting event, but not a shooting range. In a second experiment, the WFE occurred when a priest was shown with a gun, but not when a police officer had the gun. Finally, Hope and Wright (2007) showed with a dual task condition (i.e., requiring participants to keep track of numbers on their screen while also paying attention to a slide presentation) that attention indeed is distracted in the presence of a weapon or unusual item, but not for a typical object.

Generally, these studies supported the WFE with a memory questionnaire involving several recall or recognition questions about the scene, but not with a test of eyewitness identification from a lineup. This likely was due to the combination of three factors. First, a memory questionnaire is more sensitive to the WFE than is a single recognition test in the form of a lineup (Pickel, 2007; Steblay, 1992). Second, studies typically tested eyewitness memory with only a perpetrator-present lineup, which provides half of the data (i.e., only correct identifications of the perpetrator) required to determine eyewitness identification accuracy. A perpetrator-absent lineup also is required so that false alarms (i.e., choosing an innocent suspect) can be calculated. These then can be combined with correct identifications in several ways to calculate various estimates of overall accuracy. Third, many experiments involved approximately 20-30 participants per cell, which is not enough power to detect an effect based on only one data point collected per participant (Wilcox, 2001).

More recent studies have featured high-powered experiments investigating the WFE with both perpetrator-present and perpetrator-absent lineups (Carlson & Carlson, 2012, 2014; Carlson, Dias, Weatherford, & Carlson, in press-a; Carlson, Young, Weatherford, Carlson, Bednarz, & Jones, in press-b; Erickson, Lampinen, & Leding, 2014). All of these studies have found that eyewitness identification accuracy is worse in a weapon condition compared to a typical object condition. Erickson et al. (2014) is the only one of these studies to also investigate the unusualness hypothesis. Participants took part in an online game in which they played the role of a bartender serving drinks to several individuals shown in a slide presentation. One of the customers served as the target individual, presenting an empty glass, a gun, or a rubber chicken (tested between-participants). They partially supported the unusualness hypothesis, such that participants chose an innocent suspect more often after seeing either the gun or the chicken, but were no less likely to correctly choose the perpetrator after seeing the chicken.

We are aware of only two studies involving a typical object used as a weapon (Carlson & Carlson, 2012; Kramer et al., 1990). Kramer et al. (1990; Experiment 1) pre-

sented a mock crime as a series of slides depicting a small group of men playing cards. After the game, a man carrying a bottle approaches another man and smashes the bottle over his head. When the bottle was clearly visible (they also had a low visibility condition), participants were worse on a later recall test and gave a more impoverished description of the perpetrator. There was no effect on eyewitness identification, though they presented only a perpetrator-present lineup, and there was a floor effect for correct identifications (i.e., the perpetrator was not chosen more than chance for any condition). Carlson and Carlson (2012) included a similar condition: A video depicts a man approaching the participants' point of view (POV), then apparently strikes the POV with a beer bottle. Unlike Kramer et al. (1990), they did not find a WFE, even though they tested memory with both perpetrator-present and perpetrator-absent lineups.

The Present Study

Neither Kramer et al. (1990) nor Carlson and Carlson (2012) had the explicit goal of extending the WFE to a typical object used in an atypical manner, such as an object not typically considered to be a weapon actually used as a weapon. Our goal was to design an experiment to test this possibility directly, in addition to providing another test of the WFE and unusualness hypothesis as typically studied (i.e., by including a weapon condition and an unusual object condition). As described below, our participants viewed a video in which a target individual (i.e., the perpetrator) is seated at a desk in a home office (a) stapling papers with a black stapler, then standing to hand the stapler to the participants' POV (typical object, typical action); (b) stapling papers with the black stapler, then standing and appearing to strike the participants' POV with the stapler (typical object, atypical action); (c) playing with a child's toy stuffed animal, then standing and handing it to the participants' POV (atypical, non-weapon object); or (d) holding a black handgun, then standing and pointing it at the participants' POV (weapon condition).

We tested four hypotheses. First, we expected to replicate the WFE in the form of worse eyewitness identification accuracy in the gun condition compared to the typical object/action condition. Second, we sought to support the unusualness hypothesis as typically defined by finding worse eyewitness identification accuracy for the atypical object (toy) condition compared to the typical object/action condition. Third, we expected a WFE for the typical object/atypical action (stapler used as a weapon) compared to the typical object/action (stapler used only as a stapler). Finally, we also collected confidence after every lineup decision in order to assess the confidence-accuracy (CA) relationship. We sought to support recent WFE research by finding a strong CA relationship regardless of condition (Carlson et al., in press-ab). We describe our rationale for this final hypothesis in the Results section.

METHOD

Participants

Students (N = 963) attending one of two U.S. universities participated in the experiment for course credit. Data from 113 participants were eliminated due to failures to correctly answer manipulation check questions at the end of the experiment regarding the

mock crime video. Data analysis proceeded on the data from the remaining 850 participants (74% female; *M* age = 21.1, *SD* = 5.8; 64% Caucasian, 18% African-American, 8% Hispanic/Latino, 8% Other/Undisclosed). We received approval to conduct this experiment from both universities' Insitutional Review Boards.

Materials

The second author recorded a video (no audio) from a first person, point of view (POV). The POV enters the house through the garage and proceeds down a hallway and into a home office. Each version of the video is identical in these respects, and a man always is seen seated at the desk in the office, facing the POV. Our manipulation involved the object with which the man is interacting, and what he does with it. In one version (typical object/action), he is seen stapling papers with a black stapler, and as the POV approaches, he stands up and hands the stapler to the POV. The second version (typical object/unusual action) also shows him stapling papers, but this time he stands up and appears to strike the POV in the head with the stapler. In the third version (unusual object) the man is playing with a toy stuffed animal, then he stands and hands it over to the POV. Our final version (weapon) shows the man sitting at the desk, then he picks up a black handgun from the desk (same size and color as stapler from other conditions), stands and points it at the POV. See Figure 1 for images from each condition. Each version ends immediately after the man stands and completes the action with the object. Each version is 25 seconds in duration, and a frontal view of the man's face is clearly visible from about 1-2 meters away for the final 7 seconds. The actor portraying the target/perpetrator was instructed to maintain a neutral expression in every condition.

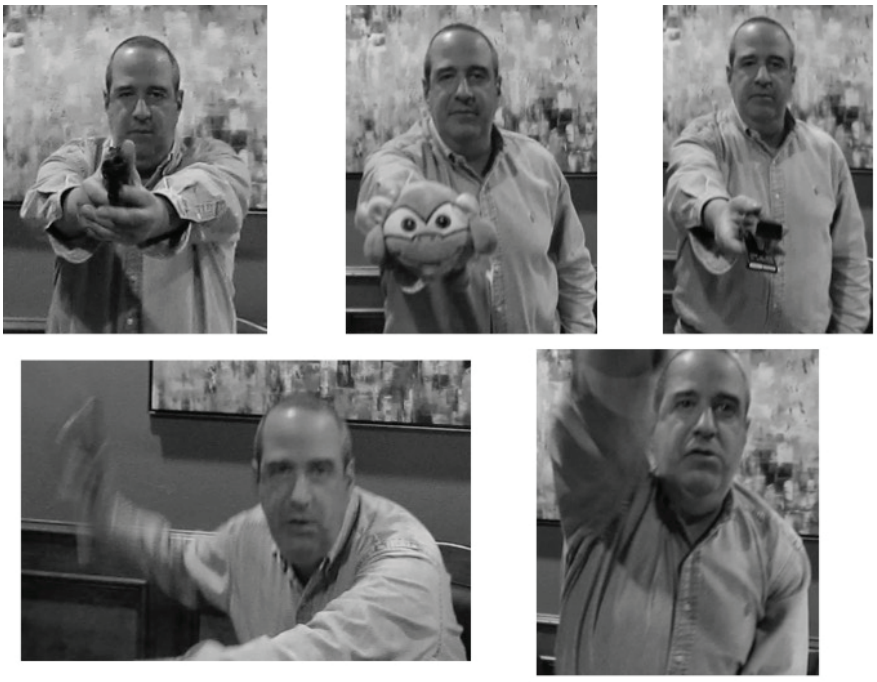

Figure 1. Screen shots from the video conditions. Upper left: weapon; upper middle: toy; upper right: typical object and action; both lower images: typical object as weapon.

We took a photo of the target/perpetrator on a different day than when the videos were recorded, then cropped the photo so only his face could be seen. Several research assistants provided an independent description of his face, which we combined into the following modal description: Middle-aged, White male, about 6-foot tall, medium build, bald or balding. We provided this description to another research assistant who had not seen any of the videos. She searched the Arkansas Department of Corrections database (Arkansas Department of Corrections, 2016) for faces that matched this description, yielding dozens of matches. The original group of research assistants chose one face from this group that best matched the man from the video. This face became our designated innocent suspect. We used the remaining faces from the database as foils to construct five perpetrator-present and five perpetrator-absent (containing the innocent suspect) lineups. Each lineup contained six individuals: The perpetrator or the designated innocent suspect and a unique set of five foils.

We presented the 10 lineups to a group of 83 participants, independent from the group who later participated in the experiment. Each lineup was presented individually, preceded by the modal description (the mock crime video was not shown). Participants were instructed to simply choose the member of each lineup that they thought best matched the description. From their choices, we calculated lineup fairness based on Tredoux's *E'* (Tredoux, 1998), which ranges from 1 (very biased lineup) to the nominal lineup size of six (very fair lineup). We chose the fairest perpetrator-present lineup ($E = 4.41$, 95%; CI: 3.71-5.44) and perpetrator-absent lineup ($E = 4.69$, 95%; CI: 3.87-5.94) for use in the experiment.

Procedure

SurveyMonkey hosted the experiment online, and each student participated via computer in a location of their choice (except we selected an option in SurveyMonkey to prevent the use of mobile devices). Following random assignment to condition, participants provided informed consent and then were instructed to pay close attention to a video on the following screen, which was coded to take up most of the screen. Following the video, they worked on anagrams of U.S. States for 5-10 minutes. At this point they received instructions that the upcoming lineup "may or may not contain the man from the video" and that they could either choose one of the lineup members or reject the lineup. The next screen contained the six-person simultaneous lineup (2x3 array), which either contained the perpetrator or the designated innocent suspect. Immediately following their lineup decision, participants entered their confidence on a 0-100% scale (10% increments) and then answered manipulation check questions: "What object did the man have? What did he do with it?" Finally, participants answered questions regarding their sex, age, and race/ethnicity.

Design and Analysis

This experiment featured a 4 (object/action in video: handgun, toy, stapler used as a stapler, and stapler used as a weapon) x 2 (lineup: perpetrator-present versus perpetrator-absent lineup) between-subjects factorial design. We first analyzed the binary (choose suspect or not) lineup identification data with logistic regression and individual chi-squares. We then conducted signal detection analysis of the correct and false identification rates to

yield estimates of sensitivity (*d'*) and response bias. In order to evaluate the confidence-accuracy relationship, we also presented confidence-accuracy characteristic (CAC) curves (Mickes, 2015), which will be described in more detail below.

RESULTS

Logistic Regression and Chi-Square Analysis

We first conducted two separate logistic regressions: One on the perpetrator-present data (correct IDs coded as 1; all other lineup decisions coded as 0) and one on the perpetrator-absent data (false IDs of the innocent suspect coded as 1; all other decisions coded as 0). If a logistic regression yielded a significant effect, we followed up with chi-squares to investigate pairwise differences. All *p*-values are 2-tailed. Table 1 contains all proportions and frequencies for all lineup decisions.

Table 1. Proportions and Frequencies of Lineup Decisions

Condition	Perpetrator-Present Lineup			Perpetrator-Absent Lineup		
	Correct IDs	Foil IDs	Rejections	False IDs	Foil IDs	Rejections
Typical Object and Action	.63 (71/112)	.13 (14/112)	.24 (27/112)	.17 (19/114)	.33 (38/114)	.50 (57/114)
Typical Object as Weapon	.68 (57/84)	.13 (11/84)	.19 (16/84)	.16 (15/95)	.36 (34/95)	.48 (46/95)
Toy	.66 (75/114)	.13 (15/114)	.21 (24/114)	.11 (11/99)	.46 (46/99)	.42 (42/99)
Weapon	.65 (71/110)	.17 (19/110)	.18 (20/110)	.26 (32/122)	.30 (37/122)	.43 (53/122)

Note. IDs=Identifications

Participants chose the perpetrator an equivalent number of times across the four conditions, Wald (3) = 0.46, $p = .93$, but our manipulation did influence the likelihood of choosing the innocent suspect, Wald (3) = 8.95, $p = .03$. Specifically, participants were more likely to choose the innocent suspect after seeing the gun in the video, compared to all three other conditions: toy, $\chi^2(1, N = 221) = 7.97$, $p = .006$, $\phi = .19$, stapler used as a stapler (marginally), $\chi^2(1, N = 236) = 3.18$, $p = .08$, $\phi = .12$, and stapler used as a weapon (marginally), $\chi^2(1, N = 217) = 3.43$, $p = .07$, $\phi = .13$. These results partially replicate Erickson et al. (2014), who also found an effect on innocent suspect identifications, but not perpetrator identifications. However, they found that both a novel object (rubber chicken) and weapon increased false identifications, whereas we supported only the weapon effect, not finding an effect for the toy. Maass and Kohnken (1989) also found a weapon effect for false identifications, but they only used perpetrator-absent lineups, so it is unknown whether or not there would have been an effect on perpetrator identifications too. Overall our findings are in line with a meta-analysis of the WFE literature by Fawcett et al. (2013), which found that weapons produced numerically (but nonsignificantly) greater impairment on memory compared to other unusual objects. But a stronger test of our hypotheses will come about with signal detection analysis, which combines correct and false identification rates into estimates of sensitivity (i.e., the ability to discriminate between innocent and guilty sus-

pects) and response bias (defined here as the likelihood of choosing either innocent or guilty suspect).

Signal Detection Analysis

The toy yielded the highest sensitivity (*d'* = 1.64, 95%; CI: 1.61, 1.68), followed by the stapler used as a weapon (*d'* = 1.47, 95%; CI: 1.45, 1.50), and the stapler used as a stapler (*d'* = 1.32, 95%; CI: 1.30, 1.34). In replication of the WFE, the handgun reduced sensitivity (*d'* = 1.01, 95%; CI: 1.00, 1.03) compared to all other conditions. In other words, the overall ability of our participants to choose the perpetrator rather than the innocent suspect was best after seeing the video with the man playing with the toy, whereas their accuracy was worst after seeing the video with the man pointing the gun. Based on the unusualness hypothesis, we expected that the toy condition would produce sensitivity equivalent to the gun condition, and lower than the typical object/action condition. These results indicate that our distinctive object manipulation did not produce a WFE. Rather, accuracy was unexpectedly boosted by the presence of the toy.

In terms of response bias (overall choosing of perpetrator or innocent suspect), all conditions were conservative, with the toy producing the highest choosing criterion (*c* = .41, 95%; CI: .39, .43), followed by the stapler as stapler (*c* = .31, 95%; CI: .30, .32), and stapler as weapon (*c* = .27, 95%; CI: .26, .29) conditions. The gun produced the least conservative responding (*c* = .13, 95%; CI: .12, .14). In other words, after seeing the man playing with the toy, participants were least likely to choose either the perpetrator or the innocent suspect, but after seeing the man pointing the gun, they were most likely to choose either perpetrator or innocent suspect.

Confidence-Accuracy Characteristic Curves

Eyewitness confidence is a moderately-strong indicator of accuracy, given that confidence is assessed immediately after the lineup decision and under fairly well-controlled conditions (e.g., Brewer & Wells, 2006; Wixted, 2016; Wixted, Mickes, Clark, Gronlund, & Roediger, 2015). In other words, when participant-eyewitnesses choose a suspect from a lineup, and report high confidence (i.e., 90-100%), they are likely to be correct in their identification. However, historically there was thought to be a weak relationship between confidence and accuracy, though this was based on a simple statistic (the point-biserial correlation coefficient; see meta-analysis by Sporer, Penrod, Read, & Cutler, 1995), now understood to be a poor representation of the confidence-accuracy relationship (e.g., Juslin, Olsson, & Winman, 1996; Roediger, Wixted, & DeSoto, 2012). A much better method is calibration analysis, which yields statistics that summarize several aspects of the relationship across the entire range of eyewitness identification accuracy and confidence (e.g., Brewer & Wells, 2006; Palmer, Brewer, Weber, & Nagesh, 2013; Sauer, Brewer, Zweck, & Weber, 2010; Weber & Brewer, 2004). Unfortunately, calibration analysis requires a great deal of data per cell of an experimental design (Juslin et al., 1996), which made the approach untenable for the present experiment and our pool of participants.

Instead of pursuing calibration analysis, we constructed confidence-accuracy characteristic (CAC) curves (Carlson, in press-ab; Mickes, 2015). Mickes (2015) argued that

these curves would be most informative for those in the criminal justice system for two reasons. First, they highlight the accuracy of eyewitnesses who report high levels of confidence in their lineup decision. After all, these are the eyewitnesses most likely to make it all the way to trial to report this high confidence to a jury. Second, the curves depict only suspect identifications (perpetrator IDs/perpetrator IDs + innocent suspect IDs), which are of greatest importance to the criminal justice system (in contrast to foil identifications or lineup rejections).

Figure 2 depicts the CAC curves from the present study. First notice the linear function for the typical object/action condition (stapler used as a stapler). This is a fairly typical function, indicating that eyewitness confidence and accuracy are increasing concurrently and at roughly the same rate. The other conditions do not yield linear functions, but importantly they all end up in approximately the same space, with the highest confidence representing high accuracy. Those who reported 90-100% confidence were accurate in the range of 86-100%. The curve that stands out belongs to the stapler used as a weapon condition, which is the only condition with a negative relationship between confidence and accuracy from low (0-60%) to medium (70-80%) confidence. In addition, those reporting the highest confidence (90-100%) in this condition are actually not much more accurate (86%) than those reporting low confidence (82%). We do not have a ready explanation for this odd pattern, as generally accuracy should increase, not decrease, as confidence increases (for exceptions, see Roediger et al., 2012). But it is interesting that this pattern arose from a condition not previously studied in terms of the CA relationship. We return to this point in the General Discussion.

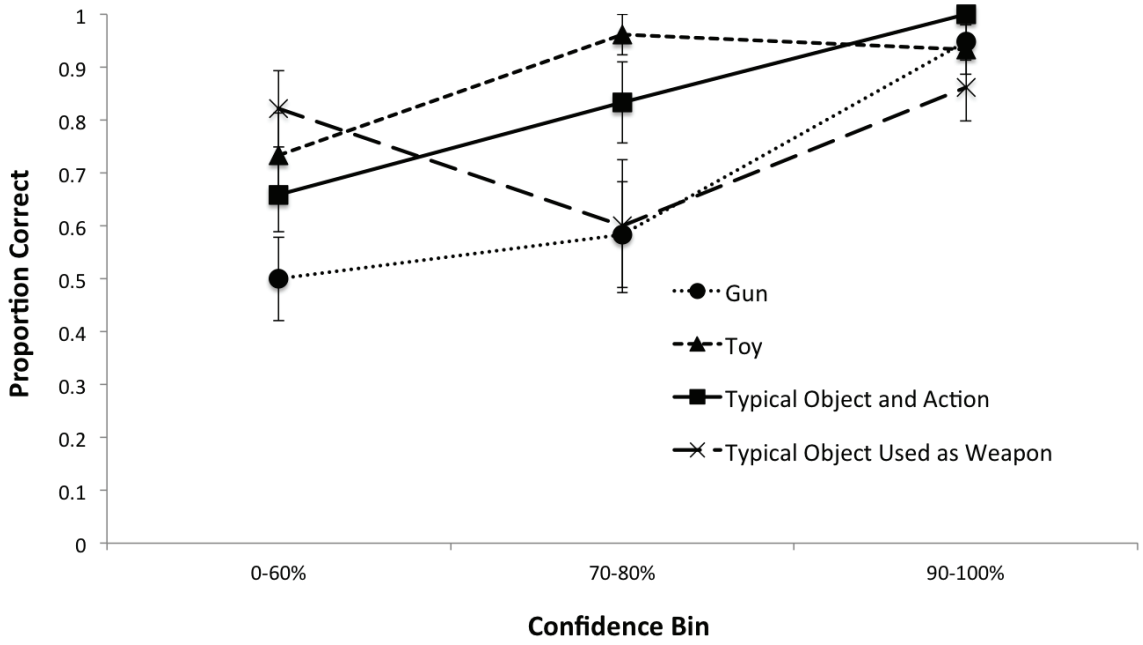

Figure 2. Confidence-Accuracy Characteristic (CAC) curves with standard error bars.

We want to focus on the overall finding across all conditions of high eyewitness identification accuracy at the highest level of confidence. This replicates recent studies manipulating several variables. Mickes (2015) identified a similar pattern in data from Palmer et al. (2013) comparing encoding times of 5 seconds versus 90 seconds. Mickes also replicated the pattern across simultaneous and sequential lineups. Carlson et al. (in press-a) found a similar pattern across conditions manipulating weapon presence and concealment. Finally, Carlson and et al. (in press-b) replicated the pattern across manipulations of weapon presence and how long the perpetrator was visible to participants (3 vs. 10 seconds). If this pattern continues to be replicated across manipulations of additional variables relevant to eyewitness identification, it should have a large influence on the interpretation of eyewitness confidence by those in the criminal justice system. We expand on this issue below.

GENERAL DISCUSSION

In the present experiment, we investigated the possibility that a typical object used in a distinctive manner (i.e., as a weapon) could produce a weapon focus effect (WFE), as is found when weapons or other unexpected objects appear in a scene. This study served a theoretical and an applied purpose. The prominent theoretical explanation of the WFE is that an unusual object will draw eyewitness attention, thereby harming their memory for other aspects of a scene. We extended this unusualness hypothesis to include a typical object used in an unusual manner (i.e., a stapler used as a weapon). In terms of application, criminals often utilize everyday objects as weapons (e.g., beer bottle, tire iron), and it would be useful for the criminal justice system to know whether or not this type of object also would yield a WFE. This could impact how police interview eyewitnesses after a crime and whether or not they would present an identification procedure (e.g., lineup, showup). It might be assumed that eyewitness memory would be impacted negatively by the presence of a weapon, but what about a typical object used as a weapon? In addition to addressing this question, we sought to replicate the standard WFE by including a condition with a handgun. We also included a condition with an unusual object (toy) to test the standard unusualness hypothesis.

Tests of the Weapon Focus Effect and the Unusualness Hypothesis

Results supported the standard WFE, such that eyewitness identification accuracy was decreased when our perpetrator was holding the handgun. This decrease in accuracy was driven entirely by an increase in identifications of the innocent suspect, as there were no differences among conditions in perpetrator identifications. This result replicates recent research that also utilized perpetrator-present and perpetrator-absent lineups: Three other high-powered experiments have found a larger impact of weapon presence on false identifications than for correct identifications (Carlson & Carlson, 2012, 2014; Erickson et al., 2014). We do not want to speculate as to potential mechanisms behind this replicated phenomenon, but the implications are certainly worth noting. After a crime involving a weapon, a guilty suspect in a lineup might not be much less likely to be chosen, but an innocent suspect in a lineup is apparently placed at greater risk. It is also important to note that, though participants had a conservative response bias for suspect identifications across

all conditions (i.e., they were not especially likely to choose either the perpetrator or the innocent suspect), they were least conservative for the handgun condition. This implies that eyewitnesses might be more willing to choose a suspect from a lineup after seeing a crime with a weapon. However, signal detection analysis is rarely applied to manipulations of weapon presence to assess effects on response bias, so this effect is in need of replication.

As for the unusualness hypothesis, we tested it in two ways (a) with an unusual object (child's toy stuffed animal), and (b) with a typical object (stapler) used in an atypical manner (as a weapon to strike a victim over the head). We failed to support both versions of the unusualness hypothesis. Participants were actually most accurate with suspect identifications after seeing the video with the toy, followed by the stapler used as a weapon. Both conditions produced higher accuracy than did the stapler used as a stapler, whereas the unusualness hypothesis predicts that this pattern should be reversed. Though the finding regarding the typical object used as a weapon is contrary to our prediction, it is in agreement with the results of the only two other studies to investigate this aspect of the unusualness hypothesis. Carlson and Carlson (2012) found no difference between their beer bottle condition and a no weapon condition (i.e., control condition with no object at all) across both perpetrator-present and perpetrator-absent lineups. Kramer et al. (1990) found that a bottle used as a weapon did reduce eyewitness recall compared to no weapon, but they did not support the WFE for eyewitness identification (though as noted earlier, they only used a perpetrator-present lineup, and their correct identifications were no higher than chance). Taking these results as a whole, we conclude that there is no evidence that a typical object used as a weapon will produce a WFE. However, it is still possible that other objects or actions could produce the effect, as so far only two objects have been tested (bottle and stapler), and only one action: Striking a victim over the head. Clearly more research is needed on other objects and actions.

The result potentially most harmful to the unusualness hypothesis is the lack of a decrement to memory when our perpetrator was seen playing with the child's toy. This condition fits the standard definition of unusual, such that the object did not belong in that context, in two ways: (a) It did not belong in the home office setting, and (b) the adult perpetrator does not match with the child's toy. Regardless of this combination of unusualness, we did not find evidence that the toy distracted participants, as their memory for the perpetrator was not harmed. However, this could be due to a limitation of the present study: The lack of a memory questionnaire. The WFE is found much more often with a sensitive memory measure like a series of recall and recognition questions about the event, as opposed to a single face recognition test in the form of a lineup (Fawcett et al., 2013). As such, we do not interpret this null result as particularly strong evidence against the unusualness hypothesis. Future studies should include a memory questionnaire as well as perpetrator-present and perpetrator absent lineups in order to more fully evaluate the impact of an unusual object on eyewitness memory for a perpetrator and scene.

The Confidence-Accuracy Relationship

We turn now to our confidence-accuracy (CA) findings. Participants in all four conditions who indicated high confidence (90-100%) after choosing from a lineup were highly

accurate (ranging from 86-100%). In addition, three of the four conditions showed good *resolution*, such that identifications backed by high confidence (90-100%) were much more accurate than identifications backed by low confidence (0-60%). The condition with lower resolution was the stapler used as a weapon, as high-confidence identifications were not much more accurate (86%) than low-confidence identifications (82%). Though this finding is in need of replication, it could be interpreted as a harmful influence of viewing a typical object used as a weapon, even though this condition did not lower overall identification accuracy. If such a situation prevents confidence from being a guide concerning accuracy, this would still be problematic to police and the criminal justice system.

Only two other studies have investigated the impact of weapon presence on the CA relationship for eyewitness identification. Carlson et al. (in press-a) presented three different versions of a mock crime scenario (purse-snatching): (a) Handgun visible in perpetrator's hand, (b) handgun concealed in perpetrator's pocket, and (c) no handgun. They were not interested in testing the unusualness hypothesis, but they did focus on the CA relationship. Their results parallel those of the present study, such that participants who reported high confidence were highly accurate in their lineup identifications, regardless of condition. All of their conditions yielded high resolution, such that low-confidence identifications were much less accurate than high-confidence identifications. Carlson et al. (in press-b) found a similar pattern when manipulating weapon presence, as have other researchers when manipulating other eyewitness identification variables, such as time available to encode the perpetrator (Palmer et al., 2013) and simultaneous versus sequential lineups (Mickes, 2015).

Conclusions and Implications

The implications of these results can be divided into two categories: (a) The effect of a weapon on eyewitness identification accuracy, and (b) the effect on the confidence-accuracy relationship. First, we replicated the weapon focus effect on eyewitness identification, which could be interpreted to mean that police should be wary about allowing an eyewitness to see a lineup if the perpetrator had an obvious weapon. After all, the evidence across several studies now indicates that the eyewitness could have relatively poor memory for the perpetrator's face, so why bother with a lineup? The answer comes from our confidence-accuracy curves. The most important recommendation to police based on the present study is to collect confidence immediately after an eyewitness's lineup decision. Evidence is mounting that identifications supported by high confidence (90-100%) are very likely to be correct, at least under fairly controlled laboratory conditions. This pattern holds true across several manipulations that affect eyewitness accuracy, such as time to encode the perpetrator (Palmer et al., 2013), weapon presence (present study; Carlson et al., in press-ab), and lineup presentation method (Mickes, 2015). Future research should extend this pattern to other relevant eyewitness variables (e.g., distance between eyewitness and perpetrator; retention interval between crime and identification; other lineup manipulations). If this strong link between high confidence and high accuracy continues to be replicated in the lab, it should then be tested in more real world situations to determine its true applicability for the criminal justice system.

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