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The External Validity of Eyewitness Identification Research:

Generalizing Across Subject Populations*

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The propriety of psychological testimony concerning factors that influence eyewitness reliability has been challenged on the grounds that the research methods and populations used in eyewitness research may not generalize. The present experiment examines one aspect of the generalizability issue and tests whether a number of factors that have produced differential performance in college-age subject populations produce similar effects in older subject populations. Subjects ranging from 18 to 74 years of age viewed a videotaped reenactment of a robbery. In the videotapes the presence of a weapon and the robber's disguise were manipulated. At the identification phase, the presence of the robber in the lineup, the lineup instructions given the witnesses, and contextual aids to witness memory were manipulated. Age produced a main effect on identification accuracy (with performance declining with age), but did not interact with any of the other variables. The results indicate that the effects of the other independent variables generalize across age groups.

The current focus among law and human behavior researchers is to identify and empirically examine behavioral assumptions underlying laws (Saks, 1986). The primary goal of the current research is to explore some of the behavioral assumptions that have been revealed in the debate over the admissibility of expert psychological testimony on eyewitness matters (see the June, 1986, issue of *Law and Human Behavior*). Is the research about which the expert testifies externally valid and applicable toward actual crimes? It is difficult to deny that the growing body of experiments on eyewitness identification is relatively homogeneous in a variety

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of respects. Konecni and Ebbesen (1986) observe that "sample-specific, stimuli-specific, task-specific, method-specific, and dependent-measure-specific findings abound in the literature—they may be said to be the rule, not the exception" (p. 121).

But does this homogeneity threaten the applicability of experimental findings to actual criminal cases? According to Konecni and Ebbesen (1986), "the external-validity problems of the memory and perception research on which the expert psychological testimony on eyewitness issues is based are so glaring that this type of testimony, at the present time, does not pass the *Frye* test" (p. 121). (The *Frye* test is a legal standard for the admissibility of novel scientific evidence.) Similar concerns have been leveled against other domains within psychology and law (Konecni & Ebbesen, 1979) and within general social psychological research (Sears, 1986). Lempert (1986), on the other hand, maintains that theory is also a critical consideration in evaluating external validity and that external validity is not merely a function of sampling considerations (see also Berkowitz & Donnerstein, 1982; Serlin, 1987).

In this research we empirically examined the generalizability of current eyewitness research. We devised an experiment in which we directly tested the generalizability of common eyewitness identification findings across one witness variable—age. Research on eyewitness identification is usually conducted using college students as subjects. Our goal was to determine whether main effects and two-way interactions that we have obtained in previous experiments (Cutler & Penrod, 1988; Cutler, Penrod, & Martens, 1987a, 1987b; Cutler, Penrod, O'Rourke, & Martens, 1986), using college students as subjects generalize to a sample who are more varied in age. But in addition to the issue of external validity, age itself is tested as a predictor of recognition accuracy.

The present experiment is exclusively concerned with adult populations. (For research on children as witnesses, see Chance and Goldstein, 1984, and, more recently, Parker, Haverfield, & Baker-Thomas, 1986.) Does age affect face recognition skills? Basic research on memory skills reveals that aging is accompanied by deficits in both encoding and retrieval skills (Craik, 1977). Age-related deficits in retrieval skills lead to the prediction that age has a stronger effect on recall than on recognition. This pattern of results has emerged in studies of verbal learning (see Craik, 1977). Erber (1974), for example, found that age accounted for 25% of the variance in recall performance and 10% of the variance in recognition performance.

In a study of eyewitness memory, Yarmey and Kent (1980) found that young subjects had superior recall for details of the crime in comparison to elderly subjects, but face recognition performance was unrelated to subject age. Other studies of face recognition have found mixed results. Some studies show decrements in person recognition among the aged (Smith & Winograd, 1978), while others show no recognition differences between adult and elderly populations (Baltes & Schaie, 1976).

The current study examines not only main effects for age, but interactions between age and other encoding and retrieval factors (and other two-way interactions that have been found in our earlier research). The interactions between

age and eyewitness factors address the generalizability issue. Do the magnitudes of the main effects observed in our earlier research differ as a function of subject age, or are the magnitudes of these main effects comparable across age groups?

METHOD

Overview

Subjects viewed a videotaped robbery (the same videotaped robbery that was used in Cutler & Penrod, 1988; Cutler et al., 1987a, 1987b, 1986) and later attempted to identify the robber from a videotaped lineup parade. The videotaped robbery portrayed the clerk of the store first serving a customer who purchased a six-pack of beer, asked for directions, and then exited the store. Next the clerk was approached and robbed by a young male carrying a handgun (either in full view or under his jacket, depending on the condition). The robber entered the store, demanded all of the money in the cash register, and threatened the clerk before leaving with the money. The entire videotaped scenario lasted approximately 100 s, while the robbery itself lasted approximately 75 s. The robber was fully visible to the viewers throughout the robbery. Two variables, disguise of the robber and weapon presence, each having two levels, were fully crossed within four versions of the videotaped robbery. In addition we manipulated four variables pertaining to the lineup procedure, each variable having two levels: lineup instructions, context interview, presence of the robber in the lineup, and lineup physical characteristic cues. The videotaped robbery and lineups were projected onto a large screen (64-in. diagonal) through the use of a Kloss Nova Beam, Model 2.

Design and Variables

Six factors, each having two levels, were manipulated within a $2^{(4+2)}$ fractional factorial design. Four variables—disguise, weapon presence, context reinstatement interview, and lineup instructions—were fully crossed in a 16-cell design. Lineup physical characteristic cues was confounded with the four-way interaction between disguise, weapon presence, context interview, and lineup instructions. Presence of the robber in the lineup was confounded with the three-way interaction between weapon presence, context interview, and lineup instructions. The variables and levels are described below.

Disguise. The robber (a) wore a hat fully covering his hair, or (b) wore no hat.

Weapon Presence. The robber (a) outwardly brandished his weapon throughout the robbery, or (b) kept his weapon hidden in his jacket.

Context Interview. The subjects (a) received the guided interview described below, or (b) received no interview. The context interval was derived in part from mnemonic procedures developed by Geiselman, Fisher, MacKinnon, and Holland (1985).

Lineup Instructions. Subjects were given instructions that were either (a) suggestive (i.e., implied that the robber was indeed in the lineup), or (b) neutral.

Presence of the Robber in the Lineup. Subjects viewed either a (a) robber-present, or (b) robber-absent lineup.

Lineup Physical Characteristics Cues. The subjects were shown (a) moving lineups (videotaped) that contained cues to gait (by showing suspects moving), posture (by showing the full-body views), and voice (via recorded voice samples), and were shown a three-quarter pose of each suspect, or (b) videotaped stills of each suspect in closeup view and from front and full-profile pose. All lineup materials, including both videotapes and photographs, were in color.

Subjects

Subjects (N = 120) were drawn from each of three different subject pools: members of a local church group; parents of a local Boy Scouts of America troop; undergraduate summer school students. Subjects in the first two groups were paid $5.00 for their participation; those from the latter group received extra credit points applicable toward an introductory psychology course. Age of subjects ranged from 18 to 74 years of age (see Figure 1 for a more complete breakdown of subject ages). Subjects were randomly assigned to conditions with 3–11 per cell.[1]

Materials

Lineup Materials. Subjects viewed one of four videotaped lineups (lineup cues and presence of the robber fully crossed). Each lineup contained six suspects with each suspect being shown for 35 s (held constant across conditions). In the strong lineup cues condition, subjects viewed a videotaped segment of each lineup member walking into a room, giving a front, three-quarter, and profile pose (right and left) from both a full-body and closeup (head and shoulders) view. Subjects in the strong lineup cues condition also heard voice samples consisting of a single spoken line. Subjects in the weak lineup cues condition viewed videotaped lineup members from a front and profile pose in the closeup view (right and left). These videotapes were recorded from the strong cue lineup with the frame held in pause so that the lineup members showed no movement. In the robber-absent lineup the robber was replaced by a look-alike; otherwise all lineup members were the same in both lineups. Lineup videotapes were presented using the same apparatus as the stimulus videotapes.

Snapshot Display. Subjects in the context interview condition were pre-

[1] Our goal was to obtain 5–10 subjects per experimental cell, which is sufficient for a fractional factorial design (Kenny, 1985). Although each subject was scheduled for a specific encoding and retrieval session, which together constituted an experimental cell, some of the church group members were unable to attend the scheduled retrieval session. As a result these subjects arrived at a later retrieval session, which had different lineup conditions. We therefore coded the subjects' data accordingly, but some of the resulting data did not match a cell in the fractional factorial design. An examination of the intercorrelations between independent variables and interaction terms revealed that this coding procedure did not pose any multicollinearity problems.

sented with an array of nine 4 × 6-in. color photographs of the inside of the liquor store, the clerk behind the counter, and the weapon (either in full view or hidden under the jacket) prior to viewing the lineup.

Interrogation Questionnaire. All subjects filled out a questionnaire concerning the crime and the characteristics of the robber. Subjects responded to a series of questions dealing with the physical characteristics (e.g., height, weight, distinguishing features) of both the robber and the clerk. In addition, subjects were asked to write down all the events that they could recall that happened up to and during the robbery.

Confidence Assessment. Confidence was measured twice. Immediately after filling out the interrogation questionnaire, subjects completed the following item: "If we showed you a lineup in which the robber was present, how confident are you that you could choose the right person?" (henceforth referred to as *prejudgment confidence*). Immediately after giving a judgment on the lineup test, subjects responded to the following item: "How confident are you that your choice is correct?" (henceforth referred to as *postjudgment confidence*). Responses to these items were recorded on scales ranging from 1 (*not at all confident*) to 9 (*very confident*).

Lineup Instructions. Before viewing the lineup, subjects were given a lineup form containing written instructions. Subjects were instructed to either (a) "Write the number of the suspect whom you believe is the robber" (suggestive instructions), or (b) "Write the number of the suspect whom you believe is the robber, or indicate that the robber is not present by writing NP" (neutral instructions).

Procedure

Prior to presentation of the robbery, all subjects were told that they would be viewing some videotaped materials and that they were to pay close attention and to not speak to each other during the experimental session. Subjects were then shown one of the four videotaped robberies. Subjects then completed the interrogation questionnaire (with no time limit) and then the prejudgment confidence questionnaires.

Retrieval sessions took place 7 days after the encoding sessions. At the beginning of the retrieval session, subjects in the context reinstatement condition were administered the reinstatement procedures in the following order: verbal mnemonic instructions, their original interrogator's questionnaire, and the snapshot display. The mnemonic instructions were to think back to the scene of the crime and the crime itself, and to remember the events of the crime from different temporal orders (e.g., recall the event in backwards order, from the last event to the first event) and perceptual perspectives (e.g., imagine that you were viewing the event from a different angle). These subjects were also instructed to recall their mood at the time they witnessed the robbery. (Subjects who did not receive the context interview proceeded directly to the lineup phase.) Subjects were then given the lineup judgment questionnaire and were shown the lineup. Subjects indicated their lineup judgments privately and then completed the postjudgment confidence questionnaire.

RESULTS

Identification Accuracy

Forty-three percent of the subjects gave correct judgments on the lineup test. In order to examine the influence of the main effects and interactions on identification accuracy, correct judgments were scored 1, and incorrect judgments were scored 0 (identification score). Subject age was standardized, the independent variables were given orthogonal codes, and the interaction terms were created via cross-products.

The identification score was then regressed over subject age (entered on the first step), the 6 main effects (entered simultaneously on the second step), and 10 two-way interactions (entered simultaneously on the third step). The 10 interactions examined were the 6 interactions between subject age and each other predictor and the following 4 interactions (examined in our previous research): Interview × Disguise; Presence of the Robber × Instructions; Presence of the Robber × Interview; and Interview × Instructions. Four three-way interactions (the interactions between subject age and each of the four two-way interactions described above) were entered simultaneously on the fourth step.

Results of the regression equation are displayed in Table 1. Listed under the columns "M_1" and "M_2" for age are the predicted identification scores for individuals one standard deviation below the mean age and one standard deviation above the mean age, respectively. As Table 1 shows, significant main effects were found for age ($r = .18$), weapon presence, and the interview, with identification accuracy rates being negatively related to age and weapon presence. The context reinstatement interview improved identification accuracy. None of the interactions involving age were statistically significant ($p > .10$ for each).

The effect of subject age on identification accuracy is more closely examined in Figure 1. Although identification accuracy indeed declines linearly with age, the largest decrement in performance is observed after the age of 50.

The interaction between the interview and disguise, which was marginally significant, showed that the interview improved identification accuracy to a greater extent if the robber was disguised than if the robber was not disguised.[2] The marginally significant interaction between presence of the robber in the lineup and instructions showed that suggestive lineup instructions reduced identification accuracy to a greater extent in the robber-absent condition than in the robber-present condition. In other words, suggestive instructions had a greater impact on false identifications than on correct identifications. The significant presence of the robber in the lineup by interview interaction showed that the interview improved identification accuracy to a greater extent in the robber-absent condition (i.e., reduced false identifications) than in the robber-present condition (i.e., increased correct identifications).

[2] The high identification accuracy rate in the high disguise–interview cell is attributable largely to correct rejections of robber-absent lineups and a relatively small number of robber-present conditions within that cell.

Table 1. Factors Affecting Identification Accuracy

Variable (levels)	M_1	M_2	d	t
Age (−1 *SD*, 1 *SD*)	.52	.35	−.37	−1.96[a]
Disguise (no hat, hat)	.50	.43	−.15	−.78
Weapon Presence (hidden, present)	.55	.37	−.38	−2.01[a]
Instructions (neutral, suggestive)	.48	.45	−.06	−.37
Interview (not given, given)	.34	.59	.53	2.46[a]
Linup Cues (weak, strong)	.44	.49	.11	.40
Presence of Robber (absent, present)	.54	.39	−.32	−1.64
Disguise × Age				−.44
Weapon Presence × Age				.50
Instructions × Age				−.81
Interview × Age				−1.46
Lineup Cues × Age				.46
Presence of Robber × Age				−.24
Interview × Disguise				1.80[b]
No Disguise (not given, given)	.39	.47	.18	.91
Disguise (not given, given)	.29	.73	.96	4.85[a]
Presence of Robber × Instructions				1.74[b]
Absent (neutral, suggestive)	.76	.40	−.79	−3.99[a]
Present (neutral, suggestive)	.36	.36	.00	.00
Presence of Robber × Interview				−2.41[b]
Absent (not given, given)	.32	.84	1.14	5.76[a]
Present (not given, given)	.36	.36	.00	.00
Interview × Instructions				−1.71[b]
Neutral (not given, given)	.33	.79	1.01	5.10[a]
Suggestive (not given, given)	.35	.41	.13	.66

[a] $p < .05$.
[b] $p < .10$.

The third step of the equation examined whether any of the above two-way interactions were further qualified by subject age. The four three-way interactions were statistically nonsignificant ($p > .40$ for each).

Confidence

Mean prejudgment confidence (i.e., confidence in ability to correctly identify the robber) was 6.86 (*SD* = 1.56); mean postjudgment confidence (i.e., confidence in lineup judgment) was 5.55 (*SD* = 2.41). Prejudgment confidence correlated .41 ($p < .01$) with postjudgment confidence and .17 ($p < .05$) with identification accuracy, whereas postjudgment confidence correlated .28 ($p < .01$) with identification accuracy. Moderated regression analysis (Morris, Sherman, & Mansfield, 1986) was performed in order to examine the influence of subject age and the independent variables on postjudgment confidence and on the postjudgment confidence–accuracy relationship. With postjudgment confidence as the dependent variable, identification accuracy was entered on the first step, the subject age and the independent variables on the second step, and the interactions between identification accuracy and each predictor on the third step. Postjudgment confidence was not significantly associated with any predictor. The moderator

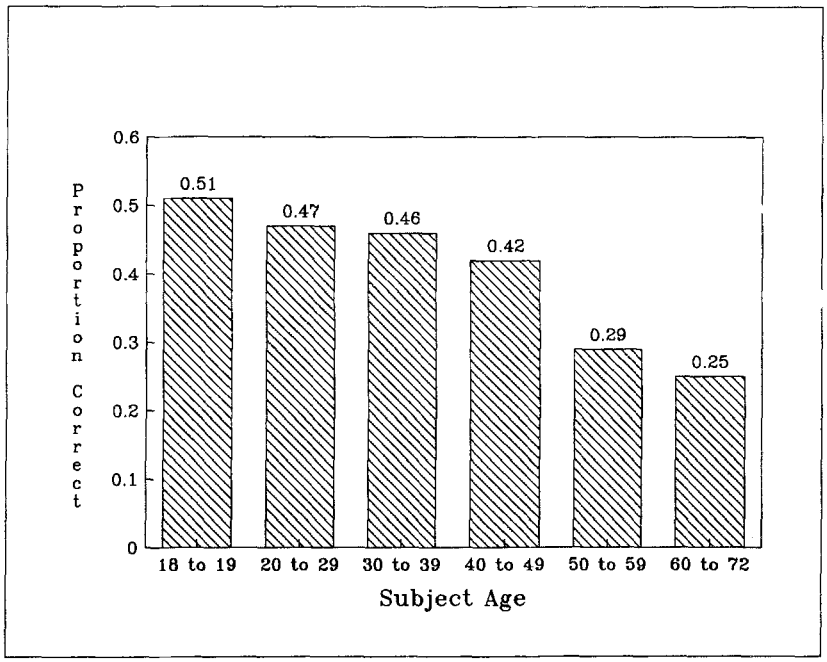

Fig. 1. The relation between age and identification accuracy. Sample sizes for age groups are as follows: for 18–19, $n = 39$; for 20–29, $n = 15$; for 30–39, $n = 28$; for 40–49, $n = 12$; for 50–59, $n = 14$; for 60–72, $n = 12$.

effect for disguise of robber was statistically significant (interaction term $t = -1.98$, $p < .05$). The correlation between postjudgment confidence and identification accuracy was .40 ($p < .01$) for subjects in the no disguise condition and .11 ($p > .05$) for subjects in the high disguise condition.

DISCUSSION

The results clearly support the generalizability of eyewitness findings across age groups. As in previous experiments (Cutler et al., 1987a, 1986; Loftus, Loftus, & Messo, 1987), the presence of a weapon led to reduced identification accuracy. Suggestive lineup instructions also reduced the accuracy of identifications, particularly when the robber was absent from the lineup; this finding is consistent with previous research (Cutler & Penrod, 1988; Cutler et al., 1987a, 1987b, 1986; Malpass & Devine, 1981a). The context reinstatement interview led to an overall improvement in identification accuracy rates as in Krafka and Penrod (1985), Malpass and Devine (1981b), and Shapiro and Penrod (1986). Two interactions involving the context reinstatement interview were also replicated. The positive influence of the context reinstatement interview was more pronounced in the

robber-absent condition than in the robber-present condition (see Cutler et al., 1986; Krafka & Penrod, 1985).

Disguise of the robber typically reduces identification accuracy (Cutler & Penrod, 1988; Cutler et al., 1987a, 1987b, 1986; Shapiro & Penrod, 1986). In the present experiment disguise reduced identification accuracy but not significantly so. But disguise interacted with the context reinstatement interview. As in Cutler et al. (1987b), the context reinstatement interview had a stronger impact if memory for the robber was degraded owing to the disguise than if memory was not degraded. However, it is not clear why the identification accuracy rate is higher in the context reinstatement interview–disguise cell than in any other cell.

Strong cues in the lineup led to a slight though nonsignificant improvement in identification accuracy. In Cutler et al. (1987b) the strong cues in the lineup led to significant improvements in identification accuracy if the retention interval was 2 weeks, whereas in the current experiment retention interval was 1 week. In addition, Cutler and Penrod (1988) found that the strong cues improved identification accuracy if the lineup members were presented simultaneously but not if the lineup members were presented sequentially, as in the current experiment. Last, the marginally significant interaction between suggestive lineup instructions and the context reinstatement interview reported by Cutler, Penrod, and Martens (1986), in which context reinstatement improved identification accuracy in the suggestive instruction condition to a greater extent than in the neutral instruction condition, was not replicated in the current experiment.

Contrary to the findings of Baltes and Schaie (1976) and Yarmey and Kent (1980), age of the subject was a significant predictor of identification accuracy, with accuracy rates falling off substantially after the age of 50. This finding is somewhat consistent with that of Smith and Winograd (1978), who found identification accuracy to decline after the age of 60. More critical is the finding that even though subject age produced a significant main effect, it did not quality any of the other main effects or two-way interactions.

As in previous research (Cutler & Penrod, 1988; Cutler et al., 1987b, 1986; Fleet, Brigham, & Bothwell, 1987) postjudgment confidence yields a stronger relationship with identification accuracy than does prejudgment confidence, but both correlations are modest. The finding that disguise of the robber moderated the confidence–accuracy correlation is consistent with Deffenbacher's (1980; Bothwell, Deffenbacher, & Brigham, 1987) optimality hypothesis. This hypothesis states that factors that influence the quality of information processing also affect the reliability of the confidence estimate. More specifically, conditions that debilitate information processing (and hence recognition accuracy) also reduce the reliability of confidence estimates (and hence the confidence–accuracy correlation).

In conclusion, in conjunction with previous research, the present experiment demonstrates that certain encoding and retrieval variables reliably influence identification accuracy, with respect to both main effects and interactions. These factors include disguise, weapon presence, suggestive lineup instructions, and context reinstatement. Age of subject also affected identification accuracy, but

did not qualify any other main effects or interactions. These findings indeed support the generalizability of eyewitness identification research, at least across age groups.

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