Journal of Personality and Social Psychology
1975, Vol. 31, No. 6, 1098–1107

Naturalistic Studies of Aggressive Behavior: Aggressive Stimuli, Victim Visibility, and Horn Honking

Charles W. Turner, John F. Layton, and Lynn Stanley Simons
University of Utah

Three studies extended laboratory research on aggression to a naturalistic setting which involved horn honking from drivers as a measure of aggression; the studies were adapted from Doob and Gross. The results from a survey (Study 1) of 59 drivers suggested that they were frequently irritated by and aggressive toward other drivers. A second study (using a 3 × 2 factorial design with 92 male drivers) indicated that manipulations of a rifle in an aggressive context and victim visibility (dehumanization) both significantly influenced horn honking rates subsequent to obstruction at a signal light. A third study with 137 male drivers and 63 female drivers examined the interactive effects of a rifle, an aggressively connotated bumper sticker, and individual subject characteristics (sex and an exploratory index of self-perceived status) on horn honking. The results for three studies in naturalistic settings offer possible extensions of laboratory based findings on aggression. The role of inhibitions in modifying the pattern of results was also discussed.

There has been considerable recent controversy about the validity of laboratory studies of aggression (Buss, Booker, & Buss, 1972; Feshback & Singer, 1971; U.S. Surgeon General's . . . Committee on Television, 1972). For example, some researchers have suggested that the commonly used measures of aggression may not have external validity. Thus, variables which affect laboratory-based responses may not influence naturally occurring aggressive responses.

One possible limitation of the laboratory setting is that subjects may sharply modify their behavior if they believe that someone is carefully monitoring and evaluating their reactions. According to Turner and Simons (1974), when subjects were led to believe that the experimenter was monitoring their responses to weapons, they were less likely than nonaware subjects to shock their partners. Awareness of the experimenter's purpose apparently caused subjects to inhibit aggressive behavior. In order to reduce the subject's inhibitions, researchers have introduced a variety of deceptions to minimize beliefs that the experiment was designed to evaluate aggressive behavior. However, many subjects today may be too sophisticated for the deceptions commonly used in the laboratory. Thus, some laboratory findings could be artifactual for two reasons. First, subjects may be responding primarily to awareness of deceptions rather than the experimental treatments (Page & Scheidt, 1971; Stricker, Messick, & Jackson, 1969). Second, their primary motivation may often be to portray themselves in a favorable light to the experimenter (Rosenberg, 1969).

Since some laboratory results may be produced by experimental artifacts such as evaluation apprehension, suspicion, negativism, and sophistication, it is important that attempts be made to investigate aggressive behavior in subjects who are not aware that they are being studied. The primary purpose of the present research was to assess whether naturalistic manipulations conceptually similar to laboratory procedures can affect human aggressive responses. Laboratory researchers have attempted to manipulate arousal, aggressive stimulation (Berkowitz, 1974; Geen & O'Neal, 1969), and dehumanization (Milgram, 1965;

Numerous individuals assisted in the completion of the present research and manuscript. We are especially indebted to Irwin Altman, Martin Chemers, Don Hartmann, Alex and Rhonda Klistoff, Ken Murray, Robert Van Wyngarden, and Jack White for their advice and assistance. The research was partly supported by University of Utah Research Committee Funds 1745 to Charles W. Turner.

Requests for reprints should be sent to Charles W. Turner, Department of Psychology, University of Utah, Salt Lake City, Utah 84112.

Zimbardo, 1969). In an exploratory attempt to extend laboratory research to a naturalistic setting, a rifle in an aggressive context (aggressive stimuli) and victim visibility (dehumanization) were manipulated in the present study for obstructed (and possibly aroused) drivers at a signal light.

In order to develop an appropriate naturalistic setting to measure aggressive responses, guidelines were adapted from Webb, Campbell, Schwartz, and Sechrest's (1966) analysis of unobtrusive measures. The following criteria were adopted to reduce subjects' perceptions that they were being studied and to develop adequately sensitive and independent measures of aggression: (a) There should be relatively low inhibitions about the behavior so that the base level responding would be considerably above zero probability, (b) the response should not be likely to produce contagion effects on other's aggression, (c) the subject's anonymity should be preserved, (d) the experimental setting should be reasonably naturalistic so that the procedures would not be an unusual imposition on the subjects or endanger them in any way, (e) the subjects should remain in the experimental setting for short periods of time such that they would not be exposed to more than one experimental treatment, and (f) the experimental treatments could be randomly assigned to subjects.

STUDY 1

Doob and Gross (1968) have offered one possible procedure for a naturalistic study of aggression. Their findings suggest that horn honking might be an aggressive reaction toward low-status drivers who prevent the flow of traffic at a signal light. Anecdotal evidence suggests that many drivers become aggressive when "frustrated" by the behavior of other drivers. Parry (1968) surveyed English drivers concerning their aggressive reactions while driving. His findings suggest that hostile reactions while driving included facial expressions, verbalizations such as swearing, hand gestures, tailgating, light flashing (high beams), and horn honking. Some drivers also reported actual fist fights or attempts to chase other drivers off the road. Parry's findings suggest that many drivers may become angry and aggressive while driving. In order to determine whether similar hostile reactions occur in Salt Lake City, a survey was conducted based on Parry's questionnaire. Thus, Study 1 was designed to determine whether there was a sufficiently high base rate of anger and aggressive responses from drivers so that experimental treatments might be expected to produce reliable results.

Method

Subjects and Procedure

The subjects were sampled from the population of frequent drivers in Salt Lake City. One hundred homes were randomly selected from the city address directory. When an investigator located a residence, the most frequent male or the most frequent female driver (randomly determined) was asked to complete Parry's (1968) driving survey. Acceptable subjects were located in 93 homes. The subjects were given a stamped envelope to return the questionnaire. If they did not respond within 2 weeks, they were again encouraged to complete the questionnaire. The subjects were assured of the complete confidentiality of their responses. Fifty-nine (63%) of the delivered questionnaires were returned.

Results and Discussion

Twelve questions (of 77) from Parry's (1968) questionnaire were selected for analysis, and the results (see Table 1) are reported separately for males and females. The findings suggest that a high proportion of "frequent" drivers sometimes become angry or are irritated by the driving behaviors of other drivers. For example, 77% of males and 56% of females reported "swearing under their breaths" at other drivers, while 50% of males and 15% of female drivers reported "flashing their lights in anger" at other drivers. While overt hostile responses were not reported by a majority of drivers on every question (e.g., Questions 1, 2, 10, and 12), there does appear to be evidence that hostile reactions to other drivers are a frequent occurrence. If the verbal reports are accurate reflections of actual driving situations, then a large number of drivers might be frequently irritated by the behavior of other drivers. This anger or irritation could sometimes lead to an overt aggressive response if such a response is readily available

TABLE 1

PERCENTAGES OF FEMALE AND MALE RESPONDENTS REPORTING HOSTILE REACTIONS TO QUESTIONNAIRE ITEMS

Questionnaire item	Male respondents (%)	Female respondents (%)
I am easily provoked when driving.	23	18
I lose my temper when another driver does something silly.	40[a]	41
I have been known to flash my lights at others in anger.	50	15
I get annoyed if the traffic lights changed to red as I approached them.	23	23
I make rude signs at other motorists when I am provoked.	15	11
At times, I've felt that I could gladly kill another driver.	12	18
If someone suddenly turns without signaling, I get annoyed.	58	92
I swear out loud at other drivers.	23	41
I swear under my breath at other drivers.	77	56
I have given chase to a driver who has annoyed me.	12	4
If the driver behind has his lights shining in my mirror, I pay him back in some way.	23	12
I am usually impatient at traffic lights.	19	7

Note. The samples are based on the responses of 26 men and 27 women.
[a] One subject did not complete the item.

(e.g., horn honking following an obstruction at a signal light).

STUDY 2

The present research was primarily designed to extend laboratory-based procedures for investigating possible determinants of aggressive reactions in a naturalistic setting. Hence, the procedure of Doob and Gross (1968) was adapted in order to manipulate exposure to aggressive stimuli and to attempt manipulations of inhibitions by dehumanization of the subject's "victim." The alleged victim (an experimental confederate) would potentially frustrate all subjects by obstructing them at a signal light.

Berkowitz and LePage (1967) manipulated aggressive stimulation by exposing some subjects to a pistol and a shotgun. One possible analogous field manipulation of aggressive stimuli would be to present a rifle in the gun rack of a pickup truck, especially since rifles are often carried that way in Utah. However, a high proportion (perhaps 50%) of Utah males have used rifles frequently in a "sporting" context. It is possible that weapons (a rifle or a pistol) are not always perceived as aggressive stimuli when they have been observed frequently in a nonaggressive context; for example, the rifles may be perceived as sporting equipment somewhat like a fishing pole or skis. In the present experiment, an attempt was made to vary the salience of an aggressive meaning for a rifle by pairing it with an ostensible bumper sticker having an aggressive or a nonaggressive label. This manipulation is somewhat analogous to one employed by Berkowitz and Alioto (1973). They led some subjects to believe that a filmed football game was a "grudge" match, while other subjects were encouraged to think of the game simply as a sporting event. Subjects watching an apparent grudge match were more likely to see an aggressive meaning to the players' actions and were more likely to shock a partner who had previously angered them. Berkowitz and Alioto's (1973) findings suggest that the *context* of stimulus materials may play an important role in determining whether the material is viewed with an aggressive meaning.

In an attempt to vary the subject's inhibitions about being aggressive, the mutual visibility of the victim and subject was varied. According to findings by Milgram (1965), subjects appeared to be more willing to administer shock to an ostensible fellow subject when they were both less likely to see and to be seen by the victim. In addition, Zimbardo (1969) has proposed that deindividuation of both the subject and victim (dehumanization) can increase the probability of aggressive behavior.

Method

Subjects

Experimental treatments were randomly assigned to 92 male drivers who served as subjects. Nine additional subjects were dropped from the sample, since they were females ($n = 4$) or male drivers of older vehicles ($n = 5$). These subjects were approximately evenly distributed across conditions. The subjects were an arbitrarily selected sample of drivers of late-model vehicles (less than 6 years of age) in a 20 × 20 block region of a mixed business–residential district of Salt Lake City. Only newer car

drivers were employed because high-status victims seem to lead to inhibitions in honking (Doob & Goss, 1968). It is possible that older car drivers would perceive themselves as having low status relative to the victim, which could lead to inhibitions masking the effects of independent variables. The experimental treatments were run on Saturdays from 9 a.m. to 5 p.m. It was assumed that Saturdays would produce a broader based sample of drivers from the potential population of all drivers, since fewer would be working. Moreover, the influence of "rush hour" traffic conditions could be minimized by testing on Saturdays.

Experimental Design

A 3 × 2 between-subjects factorial design was employed to manipulate aggressive stimulation and victim visibility (dehumanization). The subject was obstructed at a signal light for 12 sec. by an older model (1964) pickup truck with a gun rack in the rear window. The aggressive stimulation variable had three levels: (a) The gun rack was left empty (control), (b) a .303-calibre military rifle was placed in the gun rack and a bumper sticker was attached to the truck in order to reduce the perceived aggressiveness of the rifle (Rifle & "Friend" bumper sticker), or (c) the rifle was paired with a bumper sticker designed to increase the perceived aggressiveness of the rifle (Rifle & "Vengeance" bumper sticker). The bumper stickers were attached to the tailgate of the truck directly in line with the subject's vision, and they could be easily removed and reattached after each trial. The bumper stickers measured approximately 4 × 15 inches (102 × 381 mm), and the words (3 inches, or 76 mm, high) were printed with broad lettering ($\frac{3}{8}$ inch, or 9.5 mm, thick), so that they could be easily read at 50 feet (15 m). The words *friend* and *vengeance* were selected from the aggressive or altruistic lists of Parke, Ewall, and Slaby (1972). Ratings by 30 college students indicated that the word *vengeance* was highest (without also being rated high in anxiety) and *friend* was lowest on an aggressive–nonaggressive dimension from the words in Parke et al.'s lists.

Victim visibility (dehumanization) was manipulated by closing a curtain across the rear window of the pickup (without obstructing the view of the gun rack) in half of the conditions (low visibility) and leaving the curtain open in the other conditions (high visibility). The experimental conditions were run in blocks of six such that each condition was completed before any condition was replicated.

Procedure

The procedure was modeled closely after Doob and Gross (1968). An experimental confederate driving a pickup truck timed his arrival at an intersection at approximately the same time that the light turned red. If a male driver of a late-model apparently privately-owned vehicle came to a complete stop behind the confederate before the light changed to green, the driver confederate started the trial (if the conditions were not satisfied, the trial was aborted). When the light turned green, the driver-confederate started a stopwatch, faced straight ahead, and kept his brake lights on to avoid any indication that he might be having trouble with the pickup. At the end of 12 sec., the confederate moved forward with the traffic. Thus, the subjects were obstructed at the light for 12 sec. The first driver in line behind the confederate was always considered to be the subject. An observer was placed in an inconspicuous spot at the intersection so that the subject would be unlikely to see him. The observer rated demographic characteristics of the subject before the trial began (e.g., age and sex of subject; age of car, make of car, number of occupants, and general traffic density). Based on the observer's ratings, nine subjects were dropped from the sample, since they were either females or male drivers of older vehicles. The deleted subjects were inadvertently exposed to treatments when the driver-confederate could not see them clearly in his mirror. The driver's side-view mirror was partly obstructed with tape so that his reflection would not be visible to the subjects behind him when the curtain was closed. The tape also prevented the confederate from clearly seeing the subject's vehicle, and he misjudged the sex or vehicle age of some subjects. The observer's judgments were employed to establish the vehicle age or sex of subjects. The observers started a stopwatch when the light turned green and recorded the latency and frequency of honks from the subject. The observers received at least 1 hour of pretraining in the rating procedures.

RESULTS AND DISCUSSION

Subject's honking responses were dichotomized into those honking (scored as 1) and those not honking (scored as 0). According to Lunney (1970) and D'Agostino (1971), analysis of variance procedures may be applied to dichotomous data when sample sizes are reasonably large (for error, $df = 20$) and the sample proportions (means) fall between .20 and .80. Typically, hypotheses about proportions are tested with the binomial distribution, but the binomial is closely approximated by the normal distribution for n greater than 10, especially when the "population proportion" or null hypothesis is approximately .50. Since these conditions were satisfied with the present data ($\bar{n} = 15.2$; $\bar{p} = .42$), the analysis of variance procedures were employed.

The rates of honking are reported in Table 2. Five independent planned contrasts (Kirk, 1968, pp. 73–76; 178–182) were computed on the six cell means using

TABLE 2

PERCENTAGE OF HORN HONKING IN THE EXPERIMENTAL CONDITIONS OF STUDY 2

Victim visibility	Aggressive stimulation			
	Control	Rifle present		Mean %
		Friend bumper sticker	Vengeance bumper sticker	
Low visibility (curtain closed)	33.3I (n = 15)	46.7II (n = 15)	76.5III (n = 17)	52.2
High visibility (curtain open)	21.4IV (n = 14)	29.4V (n = 17)	42.9VI (n = 14)	31.2
Mean %	27.4	38.0	59.7	

Note. Cell entries refer to the percentages of subjects producing at least one honk. Numbers in parentheses refer to cell sizes. The Roman numerals specify the order of the contrast weights which were applied to means. For example in Contrast B ($-\frac{1}{3}$, $-\frac{1}{3}$, $+1$, 0, 0, 0), the contrast weight $+1$ was applied to Condition III (rifle present/vengeance bumper sticker).

an unweighted-means solution for the unequal sample sizes. The contrast weights for each mean are presented in order according to the cell subscripts (I–VI) which are reported in Table 2: Contrast A = $-\frac{1}{3}$, $-\frac{1}{3}$, $-\frac{1}{3}$, $+\frac{1}{3}$, $+\frac{1}{3}$, $+\frac{1}{3}$; Contrast B = $-\frac{1}{2}$, $-\frac{1}{2}$, $+1$, 0, 0, 0; Contrast C = -1, $+1$, 0, 0, 0, 0; Contrast D = 0, 0, 0, $-\frac{1}{2}$, $-\frac{1}{2}$, $+1$; Contrast E = 0, 0, 0, -1, $+1$, 0. The results of the planned contrast analysis indicated that the closed curtain significantly increased the rate of honking compared with the open curtain treatment, for Contrast A: $F(1, 86) = 4.43$, $p < .05$. In addition, the honking rate for the rifle/vengeance condition ($\bar{X} = .765$) was significantly higher than the average ($\bar{X} = .400$) of the other two conditions ([rifle/friend + control] $\times \frac{1}{2}$) when the curtain was closed, for Contrast B: $F(1, 86) = 5.98$, $p < .02$, but the effect was not significant when the curtain was open, for Contrast D: $F(1, 86) = 1.37$, $p > .20$. The two remaining contrasts (C and E) which compared the rifle/friend condition to the control condition were also nonsignificant ($F < 1.0$).

The results of the present study are generally consistent with the reasoning that led to the procedures, since both victim visibility and the rifle/vengeance condition increased horn honking. Thus, the present findings tentatively suggest that dehumanization and the presence of a rifle which is perceived as an aggressive stimuli can increase the probability of aggressive responding in a naturalistic setting. The rifle did not significantly influence the rate of honking when it was in a friendly or "prosocial" context (Contrasts C and E), nor did the rifle/vengeance condition significantly influence honking when the victim was visible (Contrast D). The fact that the rifle/vengeance condition honking rate was significantly higher only when the victim was not visible may be consistent with laboratory procedures used to study aggressive behavior. That is, most researchers in the laboratory typically isolate the victim from the subject in order to lower inhibitions about giving shocks. Similarly, in the present study, reduced visibility of the victim (when the curtain was closed) might have increased the rate by reducing inhibitions.

STUDY 3

One limitation of the procedure in Study 2 was that the rifle and the vengeance bumper sticker were not independently manipulated. Thus, the findings for the rifle/vengeance condition might have been due to either object alone or to the interactive effects of both objects. In Study 3, the rifle and the vengeance bumper sticker were independently manipulated so that their hypothesized interactive effects on horn honking could be tested. The vengeance bumper sticker was designed to increase the likelihood that subjects would perceive an aggressive connotation to the rifle. Previous laboratory findings suggest that uninhibited subjects would be more aggressive when they viewed stimuli with an aggressive meaning (Berkowitz & Alioto, 1973). Since it was possible that inhibitions might mask any effects of the rifle and the vengeance bumper sticker, the dehumanization (curtain) manipulation of Study 2 was employed for all conditions in an attempt to lower inhibitions.

The work of Doob and Gross (1968) suggests that there may be strong individual differences (e.g., status and sex differences) in driver's reactions to obstruction at a stoplight. Based, in part, on Doob and Gross's findings, male drivers of older vehicles and female drivers were not used as subjects in Study 2 because it was assumed that they would inhibit horn honking. Doob and Gross found that male subjects honked less at higher than lower status victims, possibly be-

cause high-status victims produced inhibitions about honking. Presumably, the lower the *subject's* self-perceived status, the higher the *victim's* status (relatively) is likely to appear. Thus, self-perceived status relative to the victim may influence willingness to honk as an aggressive response.

In the present investigation, the subjects were divided into two groups based on the age of the vehicle they were driving. This procedure was employed in an attempt to derive an exploratory measure of subject's self-perceived status. It is possible that the older a person's car, the less likely he would be to perceive himself as higher in status than the confederate in the pickup truck. Since the vehicle age variable could reflect other differences than self-perceived status (e.g., differential likelihoods of being frustrated due to different experiences with stalled automobiles), the variable was included only as an exploratory assessment of possible status differences.[1]

Several researchers (summarized by Bardwick, 1971, chap. 7) have found different patterns of male and female aggressive behavior. Further, Doob and Gross (1968) found different horn honking reactions in men and women, since women had longer latencies for their first honks. Based on these findings, it was assumed that males and females might not respond with horn honking in the same way to the manipulations of the present study if horn honking reactions to obstruction at a signal light reflect aggressive responses. Hence, the subject's sex was recorded to permit separate comparisons of the experimental manipulations for males and females. It is possible that the effects of the rifle or the vengeance bumper sticker would be significant only with male subjects driving new vehicles, since other subjects might inhibit horn honking responses.

[1] Status was varied by vehicle age rather than model for several reasons. It was assumed that different models might not be consistently perceived as representing high or low status by all drivers (e.g., sports cars vs. luxury sedans). Moreover, it was difficult to determine how subjects would judge older model, expensive vehicles relative to newer model, less expensive vehicles. There might be considerable inconsistency in perceptions of status for model-cost and model-age variations.

Method

Subjects

Male ($n = 137$) and female ($n = 63$) drivers of apparently privately owned vehicles served as subjects. Subjects were selected by the same procedures used in Study 2 except that no restrictions were placed on the age of drivers' vehicles or sex of subjects. Four additional subjects were dropped from the sample due to recording errors (i.e., not recording age of vehicle or sex of subject).

Experimental Design

Each subject was exposed to one level of a weapon (*rifle vs. no rifle*) manipulation and one level of the bumper sticker (vengeance bumper sticker vs. no bumper sticker) manipulation in an attempt to independently manipulate perceived aggressiveness of the rifle. The status of the subjects was also classified according to a median split (approximately) on the age of the subjects' vehicle (new vehicle: *less than or equal to 4 years old*; old vehicle: *more than* 4 years old).

Procedure

The procedure was identical to Study 2 except for the independent manipulation of the bumper sticker and the rifle. In addition, both male and female drivers were exposed to the treatments. Two pickup trucks (1969 models) were used to introduce the experimental conditions. These trucks were 5–6 years newer than the truck used in Study 2. Hence, the victims' perceived status in Study 3 might have been higher than that of the victim in Study 2.

Hidden observers started a stopwatch when the light turned green and recorded the latency and frequency of honks. The raters also recorded information about subject's age, sex, and age of vehicle. The raters received at least 1 hour of pretraining in the rating procedures. In order to assess the reliability of observer ratings, two raters were employed for two separate samples of subjects (Sample A = 62 subjects from Study 3; Sample B = 46 subjects from an unpublished study testing other hypotheses about the effects of a rifle). The percentage agreement between the raters for presence or absence of a honk was 100% in Sample A and 96% in Sample B. The reliability (r_{xx}) for rated age of subject's auto was .83 for Sample A and .78 for Sample B; most of the disagreements occurred for older age autos. Reliabilities for frequency of honking were .94 in Sample A and .87 in Sample B; reliability for latency of honking was .90 for both Samples A and B. No attempt was made to record or rate duration of honks, since reliabilities of ratings would have been too low, and adequately sensitive, portable tape recorders were not available to record the honks.

RESULTS AND DISCUSSION

As in Study 2, subject's horn honking responses were dichotomized into those honking (scored as 1) and those not honking (scored

as 0). According to the reasoning advanced above, it was assumed that the effects of the rifle would be most pronounced when it appeared in an aggressive context (i.e., the bumper sticker). Predictions about the interactive effect of the rifle and the bumper sticker can be tested most directly by a planned comparison procedure. The primary interaction hypothesis was tested by a contrast that compared the rifle/vengeance condition to the average of the other three rifle and vengeance combinations (Contrast A: $-\frac{1}{3}$, $-\frac{1}{3}$, $-\frac{1}{3}$, $+1$). Two additional independent contrasts were selected: The second contrast compared the rifle/no bumper sticker condition to the two no rifle conditions (Contrast B: $-\frac{1}{2}$, $-\frac{1}{2}$, $+1$, 0); the third contrast compared the two no rifle conditions (Contrast C: -1, $+1$, 0, 0). The pooled results for Contrasts B and C represent deviations from the main hypothesis. The mean rates (proportions) of subject honking which are reported separately for new- and old-vehicle male drivers and for female drivers are presented in Table 3. The results for the contrast analysis are summarized in Table 4.

TABLE 3

PERCENTAGE OF HORN HONKING IN THE EXPERIMENTAL CONDITIONS OF STUDY 3

Experimental conditions			
No rifle present		Rifle present	
No bumper sticker (I)	Vengeance bumper sticker (II)	No bumper sticker (III)	Vengeance bumper sticker (IV)
Male drivers of new vehicles			
50.0 (n = 18)	33.3 (n = 12)	30.4 (n = 23)	65.0 (n = 20)
Male drivers of old vehicles			
56.2 (n = 16)	38.1 (n = 21)	46.2 (n = 13)	14.3 (n = 14)
Female drivers			
80.0 (n = 15)	50.0 (n = 16)	50.0 (n = 16)	50.0 (n = 16)

Note. Cell entries refer to the percentages of subjects producing at least one honk. Numbers in parentheses refer to cell sizes. The Roman numerals specify the order of the contrast weights which were applied to means. For example, in Contrast A ($-\frac{1}{3}$, $-\frac{1}{3}$, $-\frac{1}{3}$, and $+1$), the contrast weight $+1$ was applied to Condition IV (rifle present-vengeance bumper sticker).

TABLE 4

SUMMARY OF THE CONTRAST ANALYSIS FOR HORN HONKING RATES IN STUDY 3

Source	df	MS	F
Males drivers of new vehicles			
Hypothesis (Contrast A)	1	.948	4.03*
Deviation from hypothesis (Contrast B + C)	2	.193	<1
Male drivers of old vehicles			
Hypothesis	1	1.228	5.23*
Deviation from hypothesis (Contrast B + C)	2	.128	<1
Error for males	129	.235	
Female drivers			
Hypothesis	1	.117	<1
Deviation from hypothesis (Contrast B + C)	2	.471	1.92
Error for females	59	.244	

Note. The harmonic mean ($\tilde{n}$) for new-vehicle males was 17.21, for old-vehicle males, $\tilde{n}$ = 15.48, and for females, $\tilde{n}$ = 15.72.
* $p < .05$.

New-Vehicle Male Drivers

The results for the planned comparisons indicated that the rate of honking in the rifle/vengeance condition with new-vehicle male drivers was significantly higher than the average of the other three rifle/bumper sticker conditions, for Contrast A: $F(1, 129) = 4.03$, $p < .05$. The other three conditions did not differ significantly from each other, for Contrast B + C: $F < 1.0$. It should also be noted that there is no single alternative contrast to A for new-vehicle male drivers which could be significant, maximum alternative contrast $F(1, 129) = 1.6$, $p > .20$. Hence, the results tentatively support the predictions leading to the present procedures. Although the rifle/vengeance condition was significantly different from the average of the other three conditions, a careful inspection of the means reported in Table 3 indicates that it was not significantly different from the control condition. One possible explanation for the somewhat weaker results obtained in Study 3 is based on the fact that the con-

federate-victims drove newer vehicles (3–4 years old) in Study 3 as compared to an 8–9-year-old vehicle in Study 2. Perhaps some subjects inhibited honking to victims in the newer trucks in Study 3 because the victims were perceived to be of relatively high status. Since Doob and Gross (1968) found evidence of inhibitory reactions toward high-status victims, perhaps the weaker findings in the present study were partly accounted for by inhibitory processes.[2]

Old-Vehicle Male Drivers

The three planned contrasts (A, B, C) were employed to assess the effects of treatments for old-vehicle male drivers. The results for Contrast A indicated that the rifle/vengeance condition produced significantly lower rates of honking than the other three conditions, $F(1, 129) = 5.23$, $p < .05$. The other three conditions did not differ significantly (Contrast B + C: $F < 1.0$). One possible explanation can be offered for these findings: When the old-vehicle drivers were exposed to the rifle in an aggressive context (the bumper sticker), they were more likely to perceive an aggressive meaning to the rifle and hence to their own honking responses. If they perceived their honks as potentially aggressive, they might have inhibited reactions in the presence of a higher status victim. These interpretations are somewhat similar to those offered by Ellis, Weinir, and Miller (1972), who found that subjects produced lower levels of shock giving in the presence of a rifle and a pistol. Apparently for their subjects, the weapons produced inhibitions about being aggressive. The present findings tentatively suggest that the presence of a rifle in an aggressive context (like the bumper sticker) for some male subjects may produce inhibitions rather than stimulate more aggression.

Female Drivers

The planned contrasts (A, B, C) were also applied to the cell means for female subjects. Neither Contrast A ($F < 1.0$) nor the deviation Contrasts B + C, $F(2, 59) = 1.92$, $p < .20$, were significant. The differences between conditions also were not significant when female subjects were divided by the age of their vehicles (new and old). However, the results for the females must be interpreted cautiously, since there were fewer subjects in any condition; thus, the condition differences might be significant with sample sizes as large as those obtained for the male subjects. The lower frequency of female subjects resulted from the fact that most drivers were males, at least on Saturdays.

GENERAL DISCUSSION

The primary reason for employing a naturalistic paradigm in the present research was to explore the possibility that laboratory procedures could be extended to a setting where subjects were unaware that they were being studied. While there are many advantages to naturalistic studies, one disadvantage results from the fact that it is difficult to obtain validity or manipulation checks from subjects to determine their perceptions of the experimental treatments. For example, it was not possible in the present research to assess directly any effects of the vengeance bumper sticker on subject's perception of the rifle or to measure independently possible differences in inhibitions produced by the victim visibility or vehicle age variables. As a consequence, any inferences about possible mediating principles can be offered only very tentatively, since alternative interpretations can be offered for the present results. Additional research is required before any firm conclusions are warranted about the present manipulations and the dependent measures.

The results of a survey and two naturalistic experiments in the present research tentatively suggest that findings somewhat analo-

[2] In order to assess the robustness of the aggressive stimulation manipulation which was reflected in the comparison of the rifle/vengeance condition to the control (no rifle/no bumper sticker) condition, the results for Study 2 and Study 3 were reanalyzed. A 2 × 2 factorial analysis of variance was computed using Study 2–Study 3 as one factor and the aggressive stimulation manipulation as the second factor. The results indicated that the aggressive stimulation factor was significant, $F(1, 56) = 5.78$, $p < .02$, while neither the other factor (study replication) nor the interaction was significant ($F < 1.0$). The absence of a significant interaction suggests that the pattern of results was similar in the two studies for the effect of the rifle/vengeance condition versus the control condition.

gous to laboratory research on aggression can be produced in a naturalistic setting. For example, male subjects in Study 2 were more likely to honk at a victim when he was not visible. Similarly, Milgram (1965) found in a laboratory setting that subjects were more likely to harm a victim who was not visible. Zimbardo's (1969) construct of dehumanization provides one possible explanation for the effects of victim visibility. According to the construct, inhibitions against harming a victim are lowered in the absence of cues which "humanize" a victim. The present curtain manipulations might have "dehumanized" the victim by removing visual cues from him which might have reduced possible inhibitions against horn honking as an aggressive response.

However, there is another interpretation possible for effects of the curtain manipulation. For example, the horn honking subsequent to obstruction at the light might be interpreted better as a "signal" response rather than as aggression. Since the subjects could not see the driver-confederate when the curtain was closed, they might have thought that he was being inattentive at the light. Thus, they might have used their horns to signal that the light had changed. Anecdotal evidence suggests that drivers often honk at others to attract their attention or to warn them about some danger. This alternative interpretation of the horn honking measure cannot be dismissed. Nevertheless, the pattern of findings (including the results of the survey in Study 1) suggests that drivers may become frustrated and angry at other drivers, and this anger or frustration can lead to various hostile reactions such as light flashing, swearing, or hand gestures. Presumably, horn honking might also be perceived as an aggressive response by subjects, especially in the presence of aggressive stimuli.

Male drivers of new vehicles in Study 2 gave more honks when they were exposed to the rifle/vengeance bumper sticker condition but only if they could not see the confederate. In one sense, the findings of Study 3 replicate the results for Study 2, since the honking rate in the rifle/vengeance condition was significantly higher (Contrast A) only for male drivers of new vehicles (the confederate was not visible for any subjects in Study 3).

In the present research, the vengeance bumper sticker condition was added to the rifle manipulation in an attempt to extend laboratory studies of an aggressive context for stimuli (Berkowitz & Alioto, 1973) in a naturalistic setting. The vengeance bumper sticker context was selected in an attempt to increase the salience of the aggresive connotation for the rifle. Otherwise, it was possible that an aggressive meaning of the rifle would not be salient in the gun rack of a pickup truck (e.g., it might be viewed as sporting equipment such as a fishing pole or skis). The present results are somewhat analogous to the results of Berkowitz and Alioto (1973), who found that the context in which a football game was presented played an important role in determining what aggressive reactions followed the game. When the filmed game was characterized as a "grudge match" as opposed to a sporting event, subjects were more likely to perceive an aggressive meaning to the football player's actions, and they were more likely to shock a partner who had previously insulted them. Similarly, the vengeance bumper sticker might have modified horn honking responses in the presence of the rifle because its aggressive meaning was more salient.

One important finding in Study 3 was the strong individual differences in subjects' reactions. Although male drivers of new vehicles with nonvisible victims honked more when exposed to both the rifle and the vengeance bumper sticker, the higher rates did not occur for all subjects. When male drivers of new vehicles *could* see their victim, or when male drivers of old vehicles and female drivers were exposed to the rifle/vengeance condition, they did not honk more. One possible explanation for the lower honking rates is that these subjects might have inhibited horn honking responses, especially in the presence of the rifle/vengeance condition. For example, if male drivers of old vehicles perceived themselves to be of lower status than the confederate, they might have inhibited horn honking as an aggressive response due to fears of retaliation from the high status driver in front of them. The results suggest the possibility that the presence of aggressive stimuli might lead to lower levels of aggression from many individuals due to inhibitions about

engaging in aggressive behavior. Hence, there might be important limitations on the generalizability for the effects of aggressive stimuli on horn honking responses and, possibly, on other aggressive and antisocial responses.

As with the victim visibility manipulations, there are several possible explanations for the present aggressive stimulus manipulations. For example, the rifle/bumper sticker combination might have served as a classically conditioned aggressive stimulus which elicited aggression (Berkowitz & LePage, 1967); it might have served as a retrieval cue (Tulving & Thomson, 1973) to remind subjects of previous experiences with aggressive stimuli (e.g., violent portrayals in the mass media), or it might have served as a cue which changed the subject's perceptions of the aggressive meaning of their responses (Berkowitz & Alioto, 1973; Berkowitz & Turner, 1974).

Since there are alternative explanations for the present findings which cannot be dismissed, no firm conclusions can be offered about which principles best explain the results until additional research is completed. Still, the present research provides procedures which might be used to extend laboratory research to naturalistic settings where subjects do not know that they are being studied.

REFERENCES

Bardwick, J. M. *Psychology of women: A study of bio-cultural conflicts.* New York: Harper & Row, 1971.

Berkowitz, L. Some determinants of impulsive aggression: Role of mediated associations with reinforcements for aggression. *Psychological Review,* 1974, *84,* 165–176.

Berkowitz, L., & Alioto, J. T. The meaning of an observed event as a determinant of its aggressive consequences. *Journal of Personality and Social Psychology,* 1973, *28,* 206–217.

Berkowitz, L., & LePage, A. Weapons as aggression-eliciting stimuli. *Journal of Personality and Social Psychology,* 1967, *7,* 202–207.

Berkowitz, L., & Turner, C. W. Perceived anger level, instigating agent, and aggression. In H. London & R. E. Nisbett (Eds.), *Thought and feeling: Cognitive alteration of feeling states.* Chicago: Aldine, 1974.

Buss, A. H., Booker, A., & Buss, E. Firing a weapon and aggression. *Journal of Personality and Social Psychology,* 1972, *22,* 296–302.

D'Agostino, R. B. A second look at analysis of variance on dichotomous data. *Journal of Educational Measurement,* 1971, *8,* 327–333.

Doob, A. N., & Gross, A. E. Status of frustrator as an inhibitor of horn-honking responses. *Journal of Social Psychology,* 1968, *76,* 213–218.

Ellis, D. P., Weinir, P., & Miller, L. Does the trigger pull the finger? An experimental test of weapons as aggression eliciting stimuli. *Sociometry,* 1971, *34,* 453–465.

Feshback, S., & Singer, R. D. *Television and aggression: An experimental field study.* San Francisco: Jossey-Bass, 1971.

Geen, R. C., & O'Neal, E. C. Activation of cue-elicited aggression by general arousal. *Journal of Personality and Social Psychology,* 1969, *11,* 289–292.

Kirk, R. E. *Experimental design: Procedures for the behavioral sciences.* Belmont, Calif.: Brooks/Cole, 1968.

Lunney, G. H. Using analysis of variance with a dichotomous dependent variable: An empirical study. *Journal of Educational Measurement,* 1970, *7,* 263–269.

Milgram, S. Some conditions of obedience and disobedience to authority. *Human Relations,* 1965, *18,* 57–76.

Page, M. M., & Scheidt, R. J. The elusive weapons effect: Demand awareness, evaluation apprehension, and slightly sophisticated subjects. *Journal of Personality and Social Psychology,* 1971, *20,* 304–318.

Parke, R. D., Ewall, W., & Slaby, R. G. Hostile and helpful verbalizations as regulators of nonverbal aggression. *Journal of Personality and Social Psychology,* 1972, *23,* 243–248.

Parry, M. *Aggression on the road.* London: Tavistock, 1968.

Rosenberg, M. The conditions and consequences of evaluation. In R. Rosenthal & R. Rosnow (Eds.), *Artifact in behavioral research.* New York: Academic Press, 1969.

Stricker, L. J., Messick, S., & Jackson, D. N. Evaluating deception in psychological research. *Psychological Bulletin,* 1969, *77,* 273–295.

Tulving, E., & Thomson, D. M. Encoding specificity and retrieval processes in episodic memory. *Psychological Review,* 1973, *80,* 352–373.

Turner, C. W., & Simons, L. S. Effects of subject sophistication and evaluation apprehension on aggressive responses to weapons. *Journal of Personality and Social Psychology,* 1974, *30,* 341–348.

United States Surgeon General's Scientific Advisory Committee on Television and Social Behavior. *Television and growing up: The impact of television violence.* Washington, D.C.: U.S. Government Printing Office, 1972.

Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. *Unobtrusive measures: Nonreactive research in the social sciences.* Chicago: Rand McNally, 1966.

Zimbardo, P. G. The human choice: Individuation, reason, and order versus deindividuation, impulse and chaos. In W. J. Arnold & D. Levine (Eds.), *Nebraska Symposium on Motivation* (Vol. 17). Lincoln: University of Nebraska Press, 1969.

(Received January 17, 1974)