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**Automobile Driving and Aggressive Behavior:
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Abstract

Automobiles and aggressive behavior have an extensive association, ranging from themes of dominance and territoriality to flagrant assaultive actions. A broad range of aggressive behaviors in the context of driving can be understood in terms of the disinhibition of aggression through multiple influence channels. The paper discusses the disinhibitory factors of physiological arousal, traffic context, cognitive scripts, and contagion mechanisms. Some results of two preliminary surveys concerning roadway aggression (victimization and perpetration) are presented which suggest that such occurrences are more prevalent than commonly acknowledged.

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Automobile Driving and Aggressive Behavior: Effects of Multiple Disinhibitory Influences

Aggression has always blended with automobile driving and sometimes has seemed nearly synonymous with it. The association of automobiles and aggressivity are too extensive to ignore, even in the absence of freeway shooting contagions. The car is a means of asserting dominance and is frequently an instrument of competitiveness in various forms of ritualized dueling from hot rod drag racing to frenetic scampers through freeway traffic by hurried drivers jockeying for lane position. The car is also a territorial entity, a highly personalized space sensitized to crowding, jarring, and marring. Especially in circumstances that are otherwise arousing,¹ being in a car is to inhabit a micro-environment that is easily geared toward frustration and anger. Moreover, the car itself is periodically transformed from vehicle to weapon in the hands of an enraged driver. The hood ornament, now passe, seemed to be a metaphor for a gun sight. Because the automobile affords anonymity and the opportunity to escape, it can be a fleeing mini-fortress from which aggression can burst and where inhibitions about harm-doing are often switched-off.

Aggression has long been intrinsic to the symbolization of the automobile. Car names, advertising themes, design features, and engineered capacities have routinely cast an image of the car in aggressive terms. It is no accident that cars are called Chargers, Cougars, Jaguars, Stingrays, Thunderbirds, Cutlasses, Tornados, Firebirds, Challengers, etc. Such names fit the themes of power and excitement packaged by Madison Avenue, inducing significant segments of the buying public to get behind the

¹Physiological arousal is a demonstrated consequence of traffic congestion ("impedance"), time urgency, discomfort, and other aversive conditions (cf. Stokols & Novaco, 1981). The arousal activation from environmental sources potentiates anger and aggression responses as arousal residues carry over to interpersonal exchanges. This is Zillmann's (1979; 1983) "excitation transfer" concept discussed later.

wheel of the latest automotive projectile. Dominance is transparently the core concept of the high performance machine. However, arousal, acceleration, and ritualized competition do not automatically convert to assaultive, harm-doing behavior. Human aggressiveness is not foreign to automobile driving, but violence is a significantly different matter than impatience or even anger, so the association between driving and aggression must be mapped in a differentiated way.

Aggressive behavior on roadways, while commonly found in everyday consciousness, has apparently escaped academic attention and even legal sanctions commensurate with the endangerment and harm-doing consequences. Aside from some social psychology field studies that used horn honking as a surrogate measure of aggression (Doob & Gross, 1968; Turner, Layton, & Simons, 1975), aggressive behavior in driving situations has received no scientific analysis. A British study by Parry (1968) used surveys and interviews with samples from a London borough, but his work was a descriptive account, unguided by theory. Parry did, however, show that aggressive sentiment was relatively prevalent among drivers. In his overall sample of 382 respondents, 9% of the males and 1% of the females had been in a fight with another driver; 7% of the males and 2% of the females had deliberately driven at another vehicle in anger; and 15% of the males and 11% of the females stated that "At times, I felt that I could gladly kill another driver." With regard to this latter item, Turner et al. (1975) obtained comparable results in a small sample (N = 59) survey done in Salt Lake City as a preliminary to their horn-honking experiment. Turner et al. found that 12% of the males and 18% of the females have felt that they "could gladly kill another driver." One can imagine that such sentiments have greater prevalence now in metropolitan areas like Los Angeles where congested freeways are a worsening constraint on mobility and goal attainment.

When the wave of roadway assaults erupted in California last summer it galvanized several anger/aggression themes. Communities became alarmed about an allegedly new threat of violence, suggesting a further decay of the social fabric. Many people saw the

shootings as a byproduct of the snarl of traffic congestion that has become an increasingly bothersome feature of the Southern California landscape. Suggestions of mass media influences such as road warrior scripts and "copy-cat" inducements were discussed, and resemblances to the drive-by shooting routines of youth gangs were surely noted. However, the discussions of the freeway shooting episode typically missed both the historical and the phenomenological context. Episodes of roadway shootings with escalating incident frequencies had occurred before in other cities, and freeway shootings are only one type of aggression exhibited in driving situations.

Assaultive behavior and other forms of aggression on the road have many causes and dissimilarities, yet a broad range of aggressive behavior in the context of driving can be understood in terms of the disinhibition of aggression through multiple influence channels. The disinhibition concept presumes that human aggression is significantly controlled by socially constituted inhibitory mechanisms. Social proscriptions are internalized as personal controls which regulate aggressive behavior.

This paper will discuss the disinhibitory influences of physiological arousal, traffic context factors, cognitive scripts, and contagion mechanisms. Some results of two preliminary surveys of roadway aggression concerning victimization and perpetration of aggressive behavior also will be presented which suggest that such occurrences are more prevalent than commonly acknowledged.

Overview of the California Freeway Shooting Episode

Last summer in California, freeway shootings became a daily news item. Between June 18 and the end of August, there were approximately 70 shooting incidents and one serious stabbing on Southern California roadways. Over 100 shootings were reported throughout the state. The incidents were evenly distributed across days of the week, with no distinct pattern for the time of day, although most of the shootings occurred during the afternoons or in the evenings before midnight. Most of the incidents occurred

on freeways, but about 25% took place on surface streets. Although males and females were victimized, the victims predominantly were male. The assailants were all males, with female companions in a few cases.² At times there were groups of three or four assailants. The shots were fired from cars, trucks, vans, and motorcycles. Once the wave of shootings passed, the common tendency was to view what happened as a vanishing aberration. However, this manifestation of aggression was more than an episodic occurrence idiosyncratic to California.

Sequential outbreaks of roadway shootings have periodically occurred in other metropolitan areas, and aggression on highways, shootings and nonshootings, probably occur more frequently than is generally or officially recognized. During 1982 in Houston, when there was a large influx of newcomers and very congested freeways, there were 12 traffic-related homicides. Another dozen happened in the next four years, and one occurred this year. Those were homicides — shootings were much more numerous. Last fall an episode of roadway shootings erupted in the St. Louis metropolitan area. Curiously, this escaped news media attention in California and even the Chicago Tribune, for that matter, whose columnist Mike Royko (known for his pithy phrases) had characterized last summer's shootings here as a "California wacko fad." The St. Louis area episode began on October 22 with a homicide, and there were 21 confirmed shootings into December. Some freeway shooting incidents have also just occurred in Detroit, with one young female victim being shot in the head. Thus, the wave of shootings in Southern California were not at all unique.

Driving on freeways is ingrained in our lifestyles, so we are commonly in the environments where the highly publicized assaults occurred. The apparent randomness of the shootings certainly heighten the alarm. Few of us want to think that our

²This domain of male "exclusivity" in California was recently penetrated by a female shooter on the Hollywood freeway. This historic event occurred late Saturday, March 5, 1988, when a female passenger in a red Hyundai punctuated her driver's obscene hand gestures by blasting a car of teenagers who had previously passed them.

communities have become so uncivilized that we must worry about being bushwacked on the way to work. However, the shootings are less random than commonly believed. The majority of the California incidents involved some prior dispute or conflict about road privilege — based on victims' accounts, which are likely to be underestimates. Death and serious injury victims have often been passengers, which should give drivers pause in becoming ensnared in a dispute about road space. Road shootings often occur from the right side, where passengers are closest to the blast.

As well as recognizing the historical context of freeway shootings (i.e. precursors and continuances in other geographic areas), the phenomenological context should also be recognized. Freeway shootings are only one type of aggression that occurs on roadways. They are a relatively uncommon form, perhaps exceeded in novelty only by the veritable highway robbery spree that occurred in South Florida in 1985 discussed later as a contagion episode. While verbal nastiness, threat displays, and various antagonistic driving behaviors are the more common but not-so-violent forms of aggression, there are other lethal behaviors in addition to shootings, primarily the use of the car itself as a weapon. Homocidal driving has received little scholarly attention, although incidents of notariety are sure to receive press coverage.³ British authors Marsh and Collett (1986) give some mention to deliberate lethal driving, but Spencer's (1985) criminal law review specifically addresses this topic. Reviewing cases of British drivers who deliberately drove their vehicles at pedestrians and cyclists, Spencer argues these persons who have used their vehicles as weapons receive very lenient prosecution because they are treated as motoring offenders — they are prosecuted for manslaughter rather than murder and typically receive light sentences. Roadway violence is by no means confined to shooting incidents, and the various forms of aggression in driving situations can be understood as products of disinhibitory influences.

³Among the most notable in the Los Angeles area occurred during the 1984 Olympics when Daniel Lee Young went on a sideways rampage, killing one person and injuring 48. He was found sane and sentenced to 106 years in prison.

Pseudo-Explanations of Freeway Shootings

The road shooting incidents in California had dissimilarities and many causes. Why did the assaults occur, and why did they stop remain interesting puzzles. To be sure, we must view this particular form of assault in the larger context of societal violence, as well as in relation to other forms of human aggression in automobile driving. Several explanations having colloquial appeal must be recognized as oversimplifications that fail to address multiple pathways of causation. Attempts to account for freeway shootings as being due to "wackos," "copy-cats," or "traffic stress" are too narrow or go astray.

Personality pathologies are certainly relevant factors in these incidents, and it is likely that some of those who did the roadway shootings would have engaged in some other form of aggression if this particular script had not been available to enact. A case in point is that of Albert C. Morgan, recently convicted of manslaughter for the shooting of Paul Gary Nussbaum on the freeway approaching the Costa Mesa Fairgrounds on July 18. Nussbaum is now paralyzed from the neck down. Several weeks ago, Morgan was sentenced to ten years imprisonment. During the trial, several significant facts emerged. When captured, Morgan had ammunition in both pants pockets (four bullets in one and five in the other). He was drinking heavily prior to the shooting and had a blood alcohol level of .10, four hours after the shooting. His past history had notable aggressive features, including enjoyment of archery hunting for bears and a prior roadway assault where he fought with another driver. Certainly, in this case and others, there is a conspicuous aggression-proneness factor operating.

The "follow-the-leader" or "copy-cat" explanation also plausibly accounts for part of what happened. However, most of the incidents involved some dispute or altercation, so it was not a matter of sensation-seekers merely duplicating a movie scene, a newscast, or newspaper story. Million of drivers were exposed to multimedia coverage, yet only about a hundred did the shooting. Imitative behavior and modeling influences are certainly part of the diffusion or spread of shootings throughout the community (this

pertains to the contagion concept that will be developed shortly), but latching on to the "copy-cat" idea as explanation ignores multiple pre-disposing and contextual conditions. Pre-existing aggressive habits may combine with traffic-generated physiological arousal, alcohol consumption, and the availability of weapons as disinhibiting influences, which then release antagonistic actions that escalate to serious harm-doing. Such processes, which I delineated during the summer episode (Novaco, 1987) are clearly exemplified in the Morgan case. Before shooting Nussbaum, Morgan had a prior altercation with the driver of a blue truck. His behavior followed an escalating aggressive sequence from, such as that described by Toch (1969) in examining the behavior of assaultive criminals and by Patterson (1976) in his micro-social analyses of family interaction patterns.

In contrast to being perpetrated by pathological types, some of the shootings may have involved ordinary people undergoing periods of stress who lost control of their impulses. They may have used a weapon for attack that they were carrying for defense, despite the illegality. Alternatively, the victims may only have expressed annoyance with words or gestures but then have provoked a more aggressive counter-response. Even more tragically, the victims may not be the person who initially provoked the assailant. The escalation process need not be confined to the original players. Various disinhibitory influences and mental representation processes can catalyze an anger/aggression burst in a chain of escalating antagonistic events.

A striking illustration of the above points about personality typologies and escalation effects occurs in the case of Arthur Salomon, a Wall Street investment banker and the grandson of Percy Salomon, one of the founders of Salomon Brothers. This prominent 52-year-old, seemingly model citizen, shot an unarmed college student on June 19 in a road dispute on the Hutchinson River Parkway (Stone, 1987). The conflict began with some friction over the right to pass on the freeway. It escalated to verbal exchanges on the side of the road and ended with the shooting of the young man by Salomon, as the victim was walking back to his car, saying that he had the license of

Salomon's Mercedes. Mr. Salomon is reported to have been under strain at the time and was also highly involved with law enforcement hobbies. Although he was known to be stubborn, he was well-known for his generosity. He also loved to work in his garden (Stone, 1987). Here is a case example of a distinguished citizen becoming ensnared in a road dispute, using a gun for attack that he carried for protection. Neither he nor his family and associates are likely to account for his behavior in terms of thrill-seeking wacko fads or copy-cat activity. Simplistic explanations become conspicuously so when a prominent person is the perpetrator or when an individual case is given attention in detail.

Lastly, viewing the road shootings as a product of "traffic stress" is also misguided. The California summer incidents followed no distinct pattern for day or time, but the shootings very clearly were not done by rush hour commuters stuck in traffic jams.⁴ However, traffic is not irrelevant. Being blocked or impeded on the road, as perceived by the aggressor, often provoked a shooting. The difference is how we characterize the role of traffic congestion and who we see as likely to become violent when exposed to travel impedance.

Some years ago, my colleague Dr. Daniel Stokols and I did several studies on commuter stress, which today remain the only naturalistic field research on the effects of automobile commuting (Novaco, Stokols, Campbell, & Stokols, 1979; Stokols, Novaco, Stokols, & Campbell, 1978; Stokols & Novaco, 1981). As psychologists, we were concerned with long-term exposure to traffic congestion, chronic health and behavior effects, which individuals were most at risk, and how conditions of the home and job environment influenced the experience of commuting. It is indeed true that continued exposure to traffic congestion elevates resting blood pressure, increases negative mood

⁴A traffic jam is a relatively unlikely place for a road shooting, presuming the driver/shooter wishes to escape. And it is precisely the anonymity and escape potential of freeways that provides for disinhibition. Albert Morgan, however, was in a traffic jam when he shot Nussbaum.

states, lowers tolerance for frustration, and can even lead to more impatient driving habits. However, physiological arousal, irritability, and impatience are qualitatively different from assaultive behavior. Yes, these internal states can activate aggression, but aggression is a significantly different matter, requiring an override of inhibitions about harm-doing.

Theoretical Perspective

The roadway assaults can be understood in terms of the disinhibition of aggression and as a form of violence contagion, bearing similarities to urban rioting in the 60s or to airline hijackings before airport security systems were installed. Violence contagion is a rapid social transmission of aggressive behavior. The spreading of a novel behavior throughout a social system is a diffusion process that is facilitated by communication channels. The diffusion of new ideas or innovations (kindergarten, modern math, health practices, fashion, etc.) has been studied by communication theorists such as Rogers and Shoemaker (1971) who examine structural and personality factors affecting rates of adoption. Hypothetically, the California summer episode was a diffusion pattern, and a similar process occurred in the Houston and St. Louis shootings. Another example involving violence on roadways was the cluster of over 100 freeway ambushes in South Florida on Interstate 95 in 1985 when gridlocked or deliberately disabled vehicles were set upon by assaultive robbers.

The central concept is the disinhibition of aggression — the weakening of restraints against harm-doing. One mechanism for disinhibition is exposure to unpunished aggressive behavior by others, especially if there is some novelty involved. However, our society has many disinhibitors or releasers that override the otherwise inculcated prohibitions against aggression. Cinematic portrayals, alcohol or drug use, violence-prone subcultures, the erosion of community values, etc. can combine with the anonymity of freeways, the likelihood of escape, and carrying firearms in vehicles to lessen inhibitions. The physiological arousal induced by driving a car, per se, as well as by

exposure to thwartings in transit, contributes to the override of inhibitory factors in a context that is conducive to aggressive responding. Road violence is a product of weakened social controls and personal controls, which can act in concert with arousal-inducing environmental circumstances, such as traffic congestion, work pressures, or family strain.

The spread of violence as a contagious phenomenon was discussed by LeBon (1895/1960) in his classic work on group behavior. He saw human groups as being in a state of expectant attention, susceptible to suggestion, and as thinking in terms of images, which can evoke destructive impulses. A crowd is influenced by example, and imitation was viewed by LeBon as a natural tendency. For him, contagion was a fundamental and powerful process by which ideas, sentiments, and emotions spread. However, he gave no account of contagion, except to allude to microbial analogy and refer to imitation. Behavioral contagion as a group phenomena was later examined by Redl and his associates (Polansky, Lippitt, & Redl, 1950; Redl, 1949) as behavior change occurring in social interaction that is linked with impulse expression.

The contagion concept has been utilized in analyses of increases of criminal violence (Berkowitz & Macaulay, 1971), urban rioting (Mazur, 1972; Midlarsky, 1978), and aircraft hijacking (Bandura, 1983; Holden, 1986). The basic concept in these analyses is the social diffusion of violence. Bandura, following his research on observational learning of aggressive behavior (Bandura, 1973), later approached the contagion effect in terms of symbolic modeling whereby new behavior is spread by a salient example. Observational learning is also the basis for the Berkowitz and Macaulay (1971) account for the sharp increases in violent crime found to occur following the Kennedy assassination in 1963, the Speck murder of 8 nurses in Chicago in 1966, and the Whitman shooting of 45 persons from the University of Texas tower in 1966. Various occurrences of copy-cat violence, or what the French sociologist, Tarde, in 1890 called "suggesto-imitative assaults," have often been reported following major crimes and movie theater

showings of violent films. Midlarsky's (1978) mathematical analysis of the contagion of urban disorders also conceives of the spread as an observational learning or modeling process.

It is not enough to understand contagion in terms of modeling influences. Wheeler (1966) argued that contagion was a social influence process mediated by restraint reduction. He asserted that contagion would not occur unless restraints were reduced — i.e., the lessening of fear, guilt, and regret for engaging in the behavior. For example, observing someone escape punishment for a disapproved behavior. Conditions of deindividuation or the feeling of anonymity were also thought by Wheeler to reduce restraints.

Disinhibiting Influences on Aggression During Driving

As discussed above, violence contagion is a community phenomenon of social transmission and escalation of an aggressive behavior prototype. The diffusion of the "innovation" can be understood in terms of communication processes, norms, and other social system variables as have been delineated by Rogers and Shoemaker (1971) regarding the adoption of other innovative practices. The focus here, though, is not on the social transmission but on the psychological processes entailed in particular aggressive behaviors, with disinhibition as the central concept. Modeling influences through mass communication channels is one disinhibiting influence that affects imitation or adoption of a prototype behavior. However, the modeling effects hypothetically act in conjunction with other converging facilitators, such as the physiological arousal associated with driving, the anonymity of freeways, escape potential, cinematic scripts that have pre-programmed the mind, alcohol or drug abuse, the occurrence of thwartings by "inconsiderate" drivers that "justify" aggression, and the carrying of firearms, which under conditions of arousal and anger can activate aggressive counter-responding. Such factors act as releasers that override the otherwise inculcated prohibitions about aggressive behavior.

Given that aggressive behavior is restrained by social norms and by legal penalties in the general case and that this is quite specifically so in driving situations, the delineation of disinhibiting influences is a plausible approach to understanding various forms of aggression on roadways. The following categorization is a step in this direction.

Physiological Arousal

The activation of physiological arousal systems increases the probability of impulsive behavior by over-riding restraints and heightens the probability of aggression by constituting a precondition for anger. Although anger is neither necessary nor sufficient for aggression, the role of anger as a activator of aggression has been unmistakably demonstrated in experimental laboratory research, and it is quite clearly a core ingredient of both individual and collective violence (Novaco, 1986). Physiological arousal is a defining property of anger; and as the theory and research of Zillmann (1971; 1983) has shown, arousal which has not been induced by anger provocation can add to that which has been provoked by annoying or irritating circumstances, thereby increasing the probability of aggression. Zillmann has called this process "excitation transfer." Thus, the transfer of excitation or arousal from non-provocation sources enhances or intensifies the experience of anger and the occurrence of aggression in some immediate situation where the person's emotional experience and behavior are guided by environmental stimuli linked with antagonism. Konecni (1975) has shown that cognitive "labeling" of the arousal as anger is central to the enhanced aggression effect.⁵

Driving an automobile involves many conditions of arousal activation. Merely driving a car is arousing. Passing, braking, turning, attending to other cars, unexpected occurrences, etc. are even more potent activators of arousal. Extensive research on human factors in automobile driving has demonstrated this quite clearly (cf. Stokols &

⁵Konecni (1975) found that arousal-inducing physical stimulation (aversive auditory tones) heighten aggression when conjoined with psychosocial aversiveness. Conditions of insult provided a "cognitive label" for the combined arousal state (aversive tones and aversive interpersonal interaction), resulting in greater retaliatory aggression than for insult alone or for auditory aversiveness alone (very loud and complex tones).

Novaco, 1981). Moreover, the research that Stokols and I have conducted with regard to chronic exposure to traffic congestion has found highly significant increases in baseline blood pressure, lowering of frustration tolerance, increases in negative mood, and aggressive driving habits to be associated with traffic exposure in long distance commuting.

The Transportation Context of Driving

No studies have been conducted to date that directly investigate "road warrior" behavior. In fact, very little is known about the prevalence of hostile reactions while driving. Turner et al. (1975) found that 23% of the men and 18% of the women stated that they are easily provoked when driving. Actually chasing an annoying driver was reported by 12% of the men and 4% of the women. A higher prevalence for chasing was found by Marsh (1986), who reported that a study in Scotland found that 25% of drivers in the 17 to 35 age group admitted chasing drivers who had offended them. This is very comparable to the results of my recent university sample surveys which found 29.6% reporting having chased someone (for males, the rate was 42.9%). From several studies, then, a significant number of drivers report strong negative feelings regarding road situations, and such anger or irritation may lead to actual aggression.

Traffic congestion has become a conspicuous and bothersome feature of the urban landscape. As an inevitable constraint on mobility in metropolitan areas, traffic congestion is now a major concern of communities throughout the United States and abroad, although congestion as a hindrance to mobility is not unique to automobile travel, having also occurred with horse-drawn vehicles in ancient Rome and in many 19th century European and American cities (Smerk, 1974). Our research on traffic congestion as a stressor that impacts well-being (Novaco, Stokols, Campbell, & Stokols, 1979; Stokols, Novaco, Stokols, & Campbell, 1978; Stokols & Novaco, 1981) has examined transportation experiences in the interactive context of personality, residential, and employment variables in addition to travel conditions.

Traffic congestion is viewed as a stressor in terms of the concept of impedance, a behavioral constraint on movement and goal attainment. We have operationalized impedance as a physical or objective dimension in terms of the distance and time parameters of commuting and with regard to exposure to road interchanges as nodes of congestion. We also have examined impedance as a perceptual or subjective dimension in terms of perceived aspects of travel constraints. Both the physical and the perceived dimensions of impedance have been found to impair personal well-being, job satisfaction, and quality of home life. Our research has shown that the transportation environment is reciprocally linked with characteristics of home and work environments, as well as with personality factors. We have found that seemingly "low stress" personalities can be strongly affected by high impedance commuting.

The existing transportation environment is predisposing to aggressive behavior because of increased impedance conditions. The recent Orange County Survey found that only 8% of county residents judge the current freeway system satisfactory and that 49% consider traffic to be the county's most important problem (Baldassare, 1987). Attitudes about freeways and on freeways are increasingly negative and provide fuel for violent episodes. Traffic congestion, based on CALTRANS measurements, has increased by a factor of 50 in Orange County since 1970 and has increased in Los Angeles County by 12-15% per two year interval since 1979. All transportation analyses indicate that traffic congestion will intensify, which can only increase the chances of future incidents of road violence. Bearing in mind that heat, smog, and unemployment were at minimal levels of adversity during the summer episode, changes in those conditions would only add to the danger potential. Moreover, governmental interest ought to be piqued by the report (October 31) that one shooting victim has filed suit against the City of Costa Mesa, claiming that the attack on him was a result of that city's failure to eliminate or reduce traffic congestion.

Among our research procedures with Irvine industrial area commuters was a questionnaire measure of impatient/antagonistic driving habits. This involved 16 forced-choice items concerning behavioral tendencies in traffic situations (e.g., responses to a yellow light at an intersection, someone cutting in front, someone following too closely, having to yield the right-of-way, someone not moving when a stop light changes, and so on). A summary index of impatient/antagonistic responses to these sampled situations was significantly correlated with a number of stress and anger measures obtained from a variety of methodologies (physiological, performance, and self-report) and at several different points in time. In addition to being significantly associated with diastolic blood pressure, anger, impatience, low frustration tolerance, negative mood on arrival home, and alcohol consumption, the driving habits index was also positively correlated with level of education ($r = .23$, $p < .03$) and socio-economic status ($r = .31$, $p < .004$). Consequently, one should not think of antagonistic driving as a working class, aggressive sub-culture phenomenon. Moreover, our findings on the driving habits variable reflect environmental influences, because persons who were otherwise not time-urgent, impatient, or hostile⁶ had high impatient/antagonistic driving habits scores when they were also high impedance commuters.

The traffic context can shape driving dispositions over the long-term, thereby making aggressive responding more prepotent. Elevations of arousal, negative mood, and impatience work against restraints on aggression, which are further weakened by the anonymity of roadways and the escape potential provided by the automobile. Characteristics of anonymity indeed mark the experiences of urban dwellers (Milgram, 1970), and it has been theorized by Zimbardo (1969) that conditions of anonymity (along with group presence and altered responsibility) can produce a state of deindividuation

⁶The personality factor was coronary-proneness Type A/Type B variable, as measured by the Jenkins Activity Survey (cf. Stokols et al., 1978). Type A's scored significantly higher than Type B's on the driving habits index in our low and medium impedance conditions, but the reverse was true for high impedance subjects.

that raises the probability of impulsive, irrational behavior. Although some laboratory aggression experiments simulating deindividuation conditions have had mixed results (Diener, 1976; Diener, Dineen, Endresen, Beaman, & Fraser, 1975), it seems more than plausible that a driver's lack of social connectedness to targets of aggression, relative concealment of identity, and the ability to escape by speeding away and exiting all lessen the restraining influences of social norms, social controls, and personal controls.

Cognitive Scripts of Aggression

Roadway assaults are in part a product of personal experience and exposure factors that script the individual towards aggression and lower restraints against harm-doing. Elements of the social fabric that have led to a desensitization towards violence and the presence of violence-prone subcultures add to the facilitation equations. Drive-by shootings, for example, are a routine behavior for Southern California gangs. The regular occurrence of such incidents may further establish freeway shootings in the repertoire of other drivers, or the gang behavior itself might be transposed to freeways and to other targets. The mock war games being conducted in wilderness areas with thousands of sport combat participants (many of whom are white-collar professionals) shooting paint balls at one another certainly does not diminish the concern about disinhibition and the recurrence potential.

In situations where there are salient cues for aggressive behavior, cognitive scripts of aggression embedded in the experience of the individual can potentiate an aggressive behavior chain. The psychological idea of a script pertains to how social information is cognitively represented and organized (Abelson, 1976; Bower, Black, & Turner, 1979; Higgins, Herman, & Zanna, 1981) and has alternatively been called a "social episode" by Forgas (1979; 1986), referring to cognitive representations of stereotypical interaction sequences. Forgas (1986) has begun to study implicit representations of aggression situations for understanding everyday reactions. The script idea, however, was implied in Toch's (1969) analysis of violent men, for example, when he wrote that violence was

habit-forming, viewed violent incidents as composed of stages, and asserted that offenders saw themselves as participants in violent games. "Most importantly, they start seeing elements of past violent encounters as they approach fresh situations and begin to respond routinely" (p. 186).

The concept of an aggressive script then is that of a mental programming of antagonistic behavior in a particular context whereby situational cues activate various subroutines for an actor's responses. Automobile driving is indeed impregnated with cues linked to aggressive scripts. In addition to the themes of automobile symbolization, traffic context, anger provocation, and personal histories of aggression previously discussed, there have been countless media portrayals of aggression in driving scenarios—for example, the prototypic chase scenes of Bullit and The French Connection.

Exposure to scripts which suggest or even legitimize violence have reduced inhibitions as well as programmed the mind with mental images. The modeling effects of media portrayals of violence surely are not irrelevant. I am not saying that someone tails and blasts at other motorists simply or mostly because of watching too many movies with hyped-up chase scenes or avenging angel storylines. Of course, it's more complicated, and to be sure it involves the breakdown of community values and the relative improbability of punishment for violent behavior. Yet we might understand the road assaults as an antisocial dramaturgy played out with tragic consequences. Combined with other disinhibitory influences, cognitive scripts for antagonistic behavior may be particularly potent in driving situations, making aggression difficult to deter.

Criminologists have argued that criminal sanctions are too distant and too improbable to deter offenders and that "punishment" has the least effect on those we want to punish most. With regard to the roadway assaults, the force of their argument depends on who is doing the shooting. If the freeway shooter is someone who is otherwise violent and law-breaking, it cannot be expected that he will be much deterred by new

laws or even broadcasts of increased police presence.⁷ However, if the prospective shooter is someone who is otherwise law-abiding and has a gun in the car for protection or someone not ordinarily violent but is considering "having some fun," then legislative and law enforcement responses may have a sobering influence. People do not rationally calculate the probability of getting caught or suffering the consequences (an argument used by deterrence opponents against harsher penalties), and a media report of one arrest may deter those whose inhibitions can be activated when there are no tangible rewards to over-ride them. Legislative responses reported in the media may be a visible way to operationalize community concern and disapproval of the deviants' behavior, thereby affirming community norms and leading to internalized personal control. Some freeway shooters described their actions as only intended to scare the victims — as if the bullets would never hit anyone. Perhaps this is a fiction used to exonerate themselves, but it may be that they did not comprehend that real people were involved who would be harmed. Destructive impulses must be kept in check by convergent inhibitory forces.

Contagion Mechanisms

The diffusion or contagion effects of mass media communication were discussed earlier. Calls for media downplay of violent incidents are commonly heard, and this seems relevant to slowing the social transmission; yet the media have a responsibility to report the news. However, there has been curious variation in the length and positioning of road shooting stories. Last summer, stories of freeway shootings gradually moved off the front page, partly by editorial judgment and partly displaced by other news. To illustrate, on August 26, two months after the shootings began, an arrest of an injury shooting suspect and the death of a victim of another shooting received two small paragraphs of coverage in the L.A. Times on an interior page. In contrast, a shattered window incident early in the episode received a full story on a regional front page.

⁷Despite the augmented police patrols, less than 10 arrests were made in more than 100 shootings, which translates to better than a 9 in 10 chance of escaping.

Debate regarding how the media report news or, in fact, the very issue of what constitutes "news" has emerged on many fronts in recent years, especially with regarding to reporting violence, such as international conflict, civil unrest, and acts of terrorism. On the later topic, it has been argued that there is a symbiotic relationship between terrorism and the media (Lacquer, 1987; Merkl, 1986; Rubin & Friedlander, 1986). This point has also been made by media professionals, such as several contributors to the Netanyahu (1986) volume on terrorism (cf. the papers by Krauthammer, Schorr, & O'Sullivan, as well as the Appendix comments by Koppel, Podhoretz, and others). This symbiosis parallel to terrorism is somewhat overstretched with regard to road violence, because terrorists explicitly seek to publize a political cause to a world audience — as Rubin and Friedlander (1986) nicely delineate with their theater metaphor. Some acts of road violence may be attempted for publicity, but very few have this calculating quality, being instead of an impulsive nature. However, the stimulational, suggestive, disinhibitory influence of the media is a common feature, and the commercial value of sensational stories is unmistakably similar. And from the perspective of modeling and suggestion, broadcasts of terrorist activity model planned, strategic behavior, whereas reports of road violence model impulsive, unreasoned behavior.

Contagion influences with regard to various forms of violent behavior were presented earlier, yet there is a another type of road violence for which such effects have been found, namely in the work of Phillips (1974; 1979) on suicide and motor vehicle fatalities. In a series of studies, Phillips has demonstrated the suggestive effects of published suicide stories, first with regard to increases in suicide cases and then on motor vehicle fatalities. Regarding the latter research (Phillips, 1979), he obtained an exhaustive list of front page suicide stories (1966-73) from the five newspapers in California with the largest circulation and examined their association with subsequent motor vehicle fatalities. His careful analyses, which controlled for potentially confounding factors, systematically showed the effects of suggestion. Phillips found that

motor vehicle fatalities increase markedly right after publicized suicides (not before); the magnitude of the increase is correlated with the degree of publicity; the increase is geographically localized in association with the published story; single-vehicle crashes are most affected; age of suicide victims and age of driver are linked; and stories about murder and suicide tend to be followed by multiple vehicle crashes involving passenger deaths. His research gives a strong demonstration of suggestion and modeling influences on violent behavior on roadways.

Road Aggression Survey

Predisposing psychological states (e.g., anger, road frustration, and stress-induced antagonism) may be more prevalent in California driver populations than is currently recognized. The impulses, emotions, and self-reported behavior of the Salt Lake City sample, whose exposure to traffic congestion was surely less than our region's present levels, suggests that a significant proportion of the population may be disposed to act aggressively or violently on the road.

In this regard, two samples of University of California, Irvine, students were surveyed to assess their experiences of victimization and perpetration of aggression in driving situations. The survey involved questionnaires administered to volunteer subjects participating for course credit from a variety of social science classes. The survey was administered to groups of 20, who were mostly freshmen and sophomores. Two samples (N = 146 and N = 141) were obtained respectively in fall and winter quarters. Questionnaire administration emphasized the importance of candor and accuracy in responding, and anonymity was assured. The protocol consisted of a new road aggression questionnaire and the driving habits questionnaire from the commuting stress research. The road aggression instrument obtained background information, reports of victimization experiences, reports of targeted aggressive behaviors enacted, frequency of aggressive driving, beliefs about freeway shootings, and reports of armament in vehicles.

Very few results are reported here, because this is not intended as a empirical report and because this research is still in progress, as data are being sought from community samples. These results are presented to give a preliminary idea about the prevalence of aggression experienced and enacted by young California drivers. Although university students are not representative of the general population, they are not likely to be more aggressive than others in their age cohort or between 17 and 35 years of age.

The frequencies and percentages for the individual and combined samples regarding aggressive behaviors experienced and enacted during automobile driving are contained in Table 1. Their responses regarding armament in vehicles are contained in Table 2. The presentation here is simply a brief look at these descriptive data.

Examining the combined results for 287 subjects (112 males and 174 females), the data are highly consistent across samples which report a surprising amount of aggression experienced and enacted. One person in each sample reports having been the target of an actual shooting (one male; one female). Four persons have been threatened with a gun (three males; one female), 26.5% (32 males; 44 females) have had an object thrown at them, and 35.9% (42 males; 61 females) have been chased by another driver. Verbal arguments threatening physical violence were reported by 24.7% (40 males; 31 females) and 3.8% of the respondents (nine males; two females) reported having had a fight with physical contact in a road situation. A surprising 11.1% of the subjects (20 males; 12 females) report throwing objects at other drivers, 7.7% report bumping or ramming (15 males; seven females) and 29.6% (48 males; 36 females) say that they have chased another driver. Two male subjects, one in each sample, report threatening someone on the road with a gun. These results indicate a considerable prevalence of driving experiences involving aggression as reported by drivers with short driving histories. Moreover, these reports entail self-endangering behavior and the involvement of young female drivers.

The findings regarding weapons indicate that last summer's shooting episode did not increase weapon carrying in these samples, but 26% (38 males; 37 females) know someone who does carry a gun in his car and 7% (18 males; 3 females) of the subjects do carry some sort of weapon themselves. Other questionnaire data not given in these tables concerns aggressive behaviors in driving reported in terms of temporal frequency. These data show a considerable amount of provocative and antagonistic behavior. For example, 16.7% of the subjects (24 males; 24 females) report yelling at someone each week, and 6.3% (16 males; two females) say that they gesture obscenely on a weekly basis. Such findings are troublesome, because drivers are differentially disposed to persevere in an antagonistic exchange and to escalate it to harm-doing conclusions. Consequently, it is surely a mistake, especially during a community contagion, to become ensnared in a road dispute. To do so is to engage in an ego-oriented script that has a very bad ending.

Summary

Aggressive behavior has had a recurrent association with automobile driving reflected in our symbolization of cars and trucks, as well as being rooted in psychosocial experiences on congested roadways. Dramatic occurrences of violence such as freeway shooting episodes have been thought to be idiosyncratic events but instead need to be understood in their historical and phenomenological context. Freeway shootings are only one type of aggression occurring on roadways and are in no way unique to California.

The concept of disinhibition was central to this analysis of roadway aggression. The disinhibition of aggression was seen to result from multiple influence channels associated with physiological arousal, traffic context, aggressive scripts, and contagion mechanisms linked with the mass media. Modeling and suggestion are thought to have an important role during the diffusion of an aggressive behavior prototype.

Findings from an ongoing survey project on road aggression indicate that antagonistic behavior in driving is relatively prevalent and that provocative and self-

endangering actions are perpetrated by both male and female drivers. While it would be an exaggeration to say that antagonism and aggression are a routine part of automobile driving, the findings of the preliminary surveys indicate that such behavior is not uncommon. The topic of aggression on roadways merits continued study independent of shooting contagions.

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Table 1
Aggressive Behaviors Experienced and Enacted
During Automobile Driving

<u>VICTIMIZATION (Experienced)</u>	<u>Sample 1</u> <u>(N=146)</u>	<u>Sample 2</u> <u>(N=141)</u>	<u>Combined</u> <u>(N=287)</u>
Had object thrown at them	33 (22.6%)	43 (30.5%)	76 (26.5%)
Had been bumped or rammed	16 (11.0%)	20 (14.2%)	36 (12.5%)
Was threatened with gun	2 (1.4%)	2 (1.4%)	4 (1.4%)
Was shot at	1 (.7%)	1 (.7%)	2 (.7%)
Been chased by another driver	46 (31.5%)	57 (40.4%)	103 (35.9%)
 <u>PERPETRATION (Enacted)</u>			
Have thrown object	15 (10.3%)	17 (12.1%)	32 (11.1%)
Have bumped or rammed	10 (6.8%)	12 (8.5%)	22 (7.7%)
Have threatened with gun	1 (.7%)	1 (.7%)	2 (.7%)
Have shot at	0 (0%)	0 (0%)	0 (0%)
Have chased another driver	46 (31.5%)	39 (27.7%)	85 (29.6%)
 <u>ALTERCATIONS</u>			
Verbal arguments with threat of physical violence	37 (25.3%)	34 (24.1%)	71 (24.7%)
Fight with physical contact	7 (4.8%)	4 (2.8%)	11 (3.8)

Note: The tabled values are frequencies and percentages of respondents in two UCI undergraduate samples, assessed in groups of 20, who reported their experiences as victims and perpetrators of roadway aggression.

Table 2
Armament in Vehicle

	<u>Sample 1</u> <u>(N=146)</u>	<u>Sample 2</u> <u>(N=141)</u>	<u>Combined</u> <u>(N=287)</u>
Carry gun in their car	0 (0%)	0 (0%)	0 (0%)
Carry other weapons in car	9 (6.2%)	12 (8.5%)	21 (7.3%)
Carried weapon prior to summer shootings	8 (5.5%)	10 (7.1%)	18 (6.3%)
Know someone who carries gun in car	36 (24.7%)	39 (27.7%)	75 (26.1%)

Note: The tabled values are frequencies and percentages of respondents in two UCI undergraduate samples, assessed in groups of 20, who reported their experiences as victims and perpetrators of roadway aggression.