Safety Belts and Turn Signals: Driver Disposition and the Law

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One of the more interesting behavioral issues in traffic safety is the use of safety belts. Engaging in this behavior involves a good deal of personal choice by the driver, given that most statutes call for secondary enforcement of mandatory use laws. A similar situation exists with respect to turn signal use, where drivers are rarely cited for failure to use turn signals except as secondary to an accident or some other violation. Because the use of safety belts and turn signals involves a great deal of personal choice by drivers, it was thought that these behaviors reflect certain aspects of a driver's disposition and should, therefore, be positively correlated. From this rationale, it was hypothesized that there would be a significant and positive relationship between the tendency to use safety belts and the tendency to use turn signals. Field observation of driver behavior supported this hypothesis in two separate studies conducted before and after the enforcement of Indiana's mandatory use safety belt law. Even though the use of safety belts increased after the law went into effect, those drivers who did not use safety belts still tended not to use turn signals. Finally, a discussion of the policy implications of these findings draws upon the growing body of literature in areas that may offer useful analogies—motorcycle helmet laws, drunk driving legislation—in an attempt to focus the promotion of safety belt use.

As of the end of 1988, 31 states and the District of Columbia had laws requiring safety belt use by drivers and front seat passengers in motor vehicles (*1*). Activity in state legislatures on this topic continues. Among the 44 state legislatures that convened in regular session during 1988, 29 considered legislation to enact, amend, or repeal safety belt use laws (*2*). The most significant results were (a) Georgia enacted a mandatory safety belt use law with secondary enforcement; (b) Oregon repealed its law, which had primary enforcement; (c) Oklahoma and Louisiana extended the law to cover vans and light trucks; and (d) Hawaii increased its fine from $15 to $20 (*1*).

No longer is the effectiveness of safety belts the major issue. A previously popular rationale for not using a restraint system—"It's generally safer to be thrown clear of the accident"—has been thoroughly discredited. The number of fatalities and serious injuries that occurred after the dates each mandatory safety belt use law took effect was significantly below the number forecasted in the absence of such laws (*3,4*). The major issue now is freedom of personal choice—even to do something unwise—versus the extra costs to society as a consequence of unwise individual behavior.

Perhaps as a consequence of this philosophical conflict, most mandatory safety belt use laws are not particularly strong. Fines are modest, typically $10–$50. In 23 states and Washington, D.C., the safety belt use law provides for only secondary enforcement (*1*). In Indiana's safety belt use law (Indiana Code 9-8-14-3), "secondary enforcement" means that a motorist cannot be "stopped, inspected, or detained solely to determine compliance with this chapter." The practical meaning of such a law is that personal choice remains largely uninhibited, except to the extent that the existence of a law—even if rarely enforced—exerts a moral influence on a portion of the public.

A similar situation exists with respect to turn signal laws. Although turn signal laws are not truly subject to secondary enforcement, drivers are rarely cited for failure to use turn signals as the sole violation. Even though a turn signal law was enacted by Indiana in 1939, it is rarely enforced except as a contributing factor in accidents or along with other violations.

Because safety belt and turn signal laws are rarely enforced, they do not engender strong pressures for compliance in all drivers. The practical implication of these traffic safety laws is that personal choice to comply remains largely up to individual drivers. Many psychologists have suggested that, in situations where an individual has a good deal of personal choice, those choices will often reflect aspects of the person's disposition or personality (*5*). This implies that the choice to comply with or disregard safety belt and turn signal laws may be determined, in part, by the general disposition of the driver.

DISPOSITION THEORY

In developing this theory, it is assumed that the choice to disregard turn signal use and safety belt use are both behaviors that reflect a single underlying disposition to engage in nonconforming, risk-taking behaviors in general. Such behaviors appear to fall into a category of behaviors summarized by the personality disposition called "sensation seeking." A great deal of research has been conducted on the sensation seeking disposition (*6*), and a well-developed theory has been advanced to explain why certain people frequently engage in nonconforming, risk-taking behaviors (*7*). Briefly, the theory holds that certain people have a biological need to achieve a higher level of arousal than other people. Consequently, the sensation seeker develops a lifestyle that is geared to avoid boredom and routine, and to seek out stimulating activities and

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arousing situations. Sensation seekers often develop a disregard for social mores and a generally impulsive and nonconforming attitude toward the law (*8*). In addition, sensation seeking correlates positively with gambling, physical risk taking, and poor self-control (*6*).

The failure to use safety belts and turn signals both imply a disregard for social mores and laws. Both of these poor traffic safety behaviors are likely to be related to personal risk taking, lack of self-control, and, in a sense, gambling. An example is the driver who refuses to wear a safety belt and states, "I'd rather take my chances." Finally, both of these behaviors (the failure to use safety belts and turn signals) are likely to be exhibited by the impulsive, nonconforming individual.

The "sensation seeking" behavior described here is not necessarily of the sort manifested by those who drive at extremely high speeds or deliberately drive the wrong way on a one-way street. The behavior is often subtle and subconscious, although the actions at issue here—use of safety belts and turn signals—involve personal choice. Moreover, these choices are often made by default. To many drivers, the operation of a motor vehicle has become so familiar that the activity no longer commands a significant degree of conscious effort. Such drivers devote little more than the minimal mental effort needed to operate a motor vehicle. If a driver never took (or no longer takes) the driving task seriously enough to develop (or maintain) good habits, even those that affect the safety of one's self and others, then risk taking is present.

This line of reasoning leads to the suggestion that the failure to use safety belts and the failure to use turn signals are reflections of the same underlying disposition. If this is true, then we should find that drivers who fail to use safety belts also fail to use turn signals and, conversely, those drivers who conscientiously wear safety belts should also conscientiously use turn signals. Based on this rationale, the major hypothesis of this study was that a significant positive relationship would consistently be found between safety belt use and turn signal use.

DATA COLLECTION

To test the hypothesis, data on driver behavior were collected by 32 observers at 29 sites in September 1986. This was during the 1-yr phase-in period for the Indiana safety belt use law (Indiana Code 9-8-14-1). During the period 1 July 1986 and 1 July 1987, only warnings could be issued to violators. Use of safety belts was at that time still completely a matter of personal disposition (i.e., without penalty), although the law's passage and its upcoming effective date had received much publicity. The field personnel observed and recorded whether each driver passed through a study location (a) was wearing a shoulder safety belt, and (b) used turn signals in a situation where the law (or a reasonable, practical, and consistent interpretation of it) called for them.

Each study location consisted of a lane or lanes of traffic in which use of turn signals would be required by law. A preliminary reconnaissance of candidate sites not only led to the selection of the 29 sites used in September 1986, but also indicated which sites (because of traffic volumes or geometrics) required more than one observer and helped the personnel choose the best points from which to make their observations. A wide variety of sites were selected: signalized, stop-controlled, and uncontrolled intersections; exclusive and shared turn lanes; bridge offramps; and entry/exit driveways at shopping centers and apartment complexes. Furthermore, the observations were made on various days of the week and at different times of the day.

TABLE 1 SEPTEMBER 1986 OBSERVATIONS AT 29 SITES

	Signal Used	Signal Not Used	Missed	Row Totals
Belt used	871	287	4	1,162
Belt not used	1,660	844	4	2,508
Missed	179	88	2	269
Totals	2,710	1,219	10	3,939

It was surprisingly easy to detect whether a shoulder safety belt was in use or not, but observers were also urged to record as "missed" those drivers whose safety belt use could not be determined with certainty rather than guess at the observation. Uncertainty usually occurred for older pickup trucks, where only a lap belt may be available, and where the chrome buckle of an unused shoulder belt could not be seen over the driver's left shoulder. Of the 3,939 observations summarized in Table 1, only 277 (or 7 percent) involved "misses." To test the reliability of the observed data, a car-by-car analysis was made of the data sheets submitted by two individuals who observed 107 vehicles at the same site at the same time. There was differences in judgment on belt use for only four vehicles and on turn signal use for only two vehicles.

The data from the 3,662 complete observations at the 29 sites were used to test the following hypothesis: A driver's use of safety belts is related to his/her use of turn signals.

DATA AND STATISTICAL ANALYSIS

From Table 1, the proportion p of drivers wearing safety belts (event B) in September 1986 can be calculated as

$$p(\mathrm{B}) = 1{,}158/(1{,}158 + 2{,}504) = 0.316, \text{ or } 31.6 \text{ percent},$$

which is very close to a 1987 estimate of 0.308 for Indiana (*9*). Likewise, the proportion of drivers observed using turn signals (event T) when they are called for by law was

$$p(\mathrm{T}) = 2{,}531/(2{,}531 + 1{,}131) = 0.691, \text{ or } 69.1 \text{ percent}.$$

This is lower than the 80 percent figure reported in a self-report survey conducted by the AAA Hoosier Motor Club (*10*), but self-report surveys always overestimate desirable behavior. Therefore, both values from our data are consistent with data collected by others.

With respect to the Disposition Theory proposed for this study, the proportion of drivers who use their turn signals among those who wear safety belts, $p(\mathrm{T}|\mathrm{B})$, was

$$p(\mathrm{T}|\mathrm{B}) = 871/(871 + 287) = 0.752 \text{ versus } p(\mathrm{T}) = 0.691 \text{ overall},$$

and the proportion of drivers who wear safety belts among those who use their turn signals, $p(B|T)$, was

$$p(B|T) = 871/(871 + 1660)$$

$$= 0.344 \text{ versus } p(B) = 0.316 \text{ overall.}$$

These data suggest that a driver who wears a safety belt is more likely to use turn signals, and a driver who uses turn signals is more likely to wear a safety belt. To investigate whether these differences are significant enough to claim a relationship, a contingency analysis was conducted. The chi-square test (*11*) was used to determine whether the chance of an observation being in column 1 of Table 1 depended on the row in which the observation fell. A 2 × 2 contingency table has 1 degree of freedom (*df*) and a typical level of significance (α) for such a test is 5 percent, so the critical test parameter value is

$$\chi^2_{df,\alpha} = \chi^2_{1,.05} = 3.841.$$

The chi-square value calculated from the Table 1 data, $\chi^2 = 29.53$, exceeds the critical value of 3.841. This means that the relationship shown in Table 1 would occur by random chance less than 5 percent of the time. These chi-square test results, together with the $p(T|B)$ versus $p(T)$ and $p(B|T)$ versus $p(B)$ values shown earlier, support the safety belt-turn signal dependence proposed by the Disposition Theory.

UPDATED ANALYSIS

The Indiana safety belt use law has resulted in an increase in safety belt use. The most recent statewide survey indicates a 46 percent use rate (*12*) after secondary enforcement had commenced. As a follow-up to our September 1986 survey, data were collected at three sites in June and July 1988 to:

a. confirm the higher safety belt use rate, $p(B)$, and
b. determine the impact of the law, as reflected in the higher $p(B)$, on our Disposition Theory hypothesis.

The first two of these three sites were actually sites 12 and 21 from the September 1986 survey. They were chosen because of their proximity to our offices, not because of any special results found in September 1986. In fact, site 21 was among those sites whose 1986 data did not support the Disposition Theory hypothesis. At these two sites, safety belt use had risen from 34.2 percent during the phase-in period of the Indiana law to 50.2 percent (130 of 259 in Table 2) one year after secondary enforcement began. The contingency analysis indicates that the Disposition Theory still has merit: the calculated $\chi^2 = 23.763$, which is larger than the critical value of 3.841.

The selection of any site or set of sites introduces the possibility of biased data. However, a site-by-site search for factors that would influence the outcome of contingency tests—such as intersection controls, exclusive turn lanes, or adjacent land use—yielded no detectable pattern among our 29 original sites.

The third site chosen in 1988 was one not used in September 1986, but it had some desirable features. From a single observation point, three different situations calling for use of turn signals can be observed: turning onto a state highway, changing lanes, and turning left across the northbound (NB) lanes of the highway. The site (illustrated in Figure 1) is a segment of two southbound (SB) lanes on a state highway (SR 43) in a built-up area with a two-way volume of 12,000 vpd. The site is entered at point 1 either by traffic already on SB SR 43 or by vehicles turning right from Robinson. The use of turn signals by traffic from Robinson was recorded (Yes or No), but this observation was not applicable ("n/a" in Figure 2) to SB traffic already on SR 43. Much of this SB traffic was destined to make left turns to the Harrison Bridge (point 3) over the Wabash River or to the Levee Plaza Shopping Center (point 4). Both turns are served by separate left turn lanes. Whether a driver used turn signals in making a turn at point 3 or 4 and whether a lane change in section 2 involved use of turn signals were also recorded. In Figure 2, "n/a" under "Point 2" means that a vehicle did not make a lane change in that section and, under "Point 3 or 4," "n/a" means that no left turn was made.

During 2 hrs at this site (99 vehicles) in June 1988, only turn signal use was observed. In Figure 2, one can see evidence of a tendency to use (or not use) turn signals. The "16 Yes-15 n/a-10 Yes" branch of the event tree indicates that of the 16 vehicles that used turn signals at point 1, 15 did not change lanes at point 2, and 10 of those 15 used turn signals at point 3 or 4. Thus, only 1 of the 16 vehicles that entered the site at point 1 with proper use of turn signals failed to use them at point 3 or 4. Of the 56 vehicles that entered the site on SB SR 43, 9 used turn signals while changing lanes at point 2 and

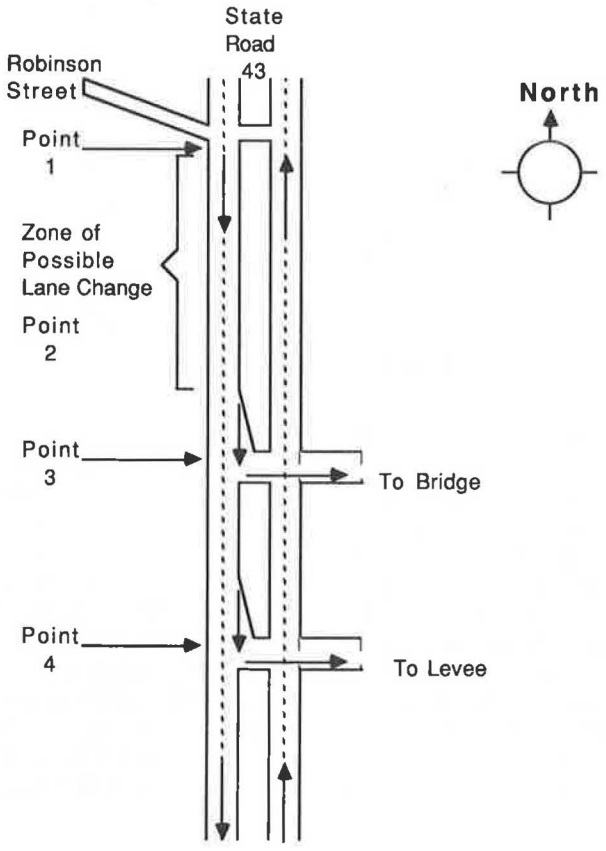

FIGURE 1 Location of simultaneous observation points.

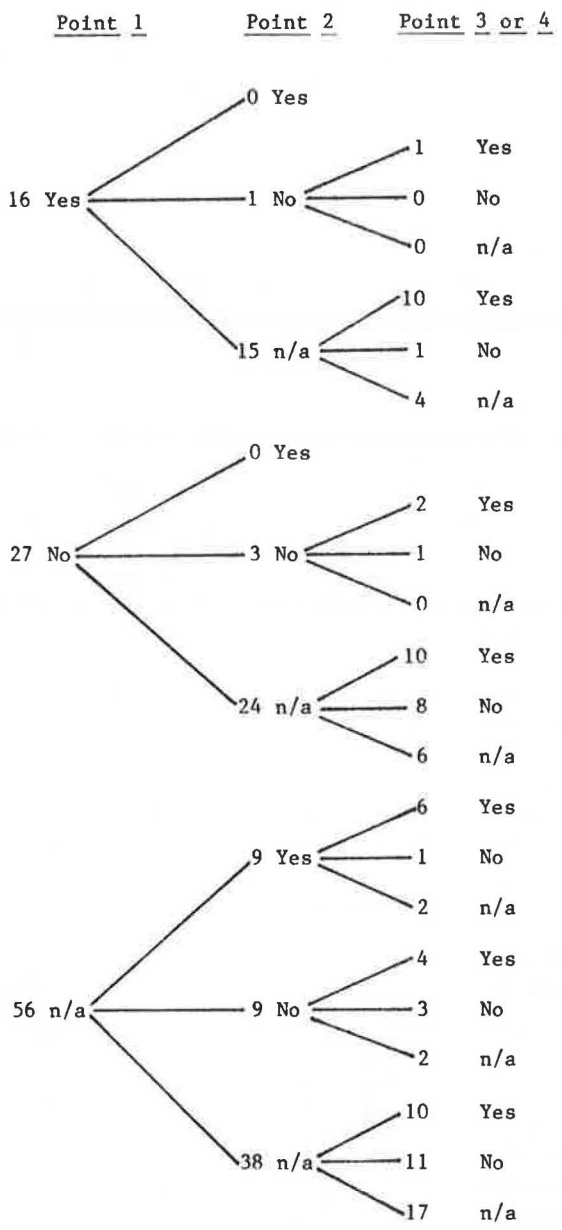

FIGURE 2 Event tree for turn signal use.

9 did not. Among the 9 that did, only 1 out of the 7 that turned left at point 3 or 4 failed to use turn signals; among the 9 that did not use turn signals at point 2, 3 of 7 also failed to use them at point 3 or 4. These chains of events are found along the branches that begin with "56 n/a-9 Yes" and "56 n/a-9 No" in Figure 2. There were 25 cases in which turn signals were used at point 1 or 2—see the branch beginning with "16 Yes" under point 1 and the branch beginning with "56 n/a-9 Yes." These branches end with a total of 17 "Yes" entries, 2 "No" entries, and 7 "n/a" entries under "Point 3 or 4." If the use of turn signals at either point 1 or point 2 is denoted as the event "T12," and if "T34" is defined as use of turn signals at point 3 or 4, one key lesson from Figure 2 is

$$p(\text{T34}|\text{T12}) = \frac{17}{25} = 0.68, \text{ and } p(\text{T34}) = \frac{34}{68} = 0.50.$$

If a turn signal has been used upstream (i.e., at point 1 or 2), it is more likely to be used downstream (at point 3 or 4). This is further evidence of the validity of our Disposition Theory, suggesting that people are consistent as to whether they adopt traffic safety behaviors.

In July 1988, data on safety belt use were collected at the SR 43 site shown in Figure 1. Of the 217 drivers observed, 128 (59 percent) were wearing a safety belt. At this point in the analysis, an attempt was made to identify personal characteristics in the observed driver population that would lead to groups to focus on in a program to promote safety belt use. A significant relationship (calculated $\chi^2 = 5.316$) was found between belt use and sex of driver. Seventy-five of 113 women drivers (66.3 percent) were wearing seat belts, while only 53 of 104 men drivers (51 percent) had seat belts on. Seat belt use by age category was

$$p(\text{B}|\text{young}) = 0.578, \; p(\text{B}|\text{mid-aged}) = 0.566, \text{ and } p(\text{B}|\text{older}) = 0.644.$$

The authors (who were also the observers) defined "young" to be drivers with apparent age 25 years or younger and "older" to be age 50 and up. These age boundaries were chosen not only to make it easier to make judgments, but also with the idea of the target population for education and promotional ads in mind.

POLICY IMPLICATIONS

An increased awareness of traffic safety issues among the general public has been taking root. In addition to the "don't drink and drive" advertisements, a variety of ads that promote safe driving behavior and safety belt use have appeared in the media. Nationwide, safety belt use increased from 11 percent in 1982 to 42 percent in 1987—52 percent in states with belt use laws versus 27 percent in states without such laws (*13*).

The results of the current study suggest that poor traffic safety behaviors tend to occur together. That is, some individuals are more likely to disregard *both* safety belt use and turn signal use. It is interesting to note that turn signal use rose from 68.8 percent before the mandatory safety belt use law took full effect (Table 1) to 80.3 percent afterwards (Table 2). This increase was almost entirely due to belt users. Turn signal use among drivers not wearing safety belts went from 66.3 percent to 68.2 percent, while those wearing belts had their turn signal use rate climb from 75.2 percent to 92.3 percent. Furthermore, the study of turn signal use reported here indicates that individual driver behavior is consistent, even under different specific conditions (e.g., turns and lane changes) where its use is called for.

TABLE 2 JUNE 1988 OBSERVATIONS AT THREE SITES

	Signal Used	Signal Not Used	Row Totals
Belt used	120	10	130
Belt not used	88	41	129
Totals	208	51	259

Another interesting aspect of this study is that the turn signal use rate is generally higher than the safety belt use rate. This appears contrary to logic, since the decision to use a safety belt (a) takes place only once per trip and (b) has clearly demonstrated benefits to the user. Meanwhile, the decision to use a turn signal (a) occurs repeatedly during a trip and (b) has benefits that quite often are greater for *other* vehicle operators in the traffic situation. More investigation into the risk perception and habit aspects of this otherwise irrational behavior appears to be called for. The Disposition Theory suggests that nonusers of safety belts or turn signals likely engage in other high-risk traffic behavior as well. Further data collection efforts are needed to identify groups in need of education with respect to traffic laws and the consequences of high-risk behavior.

Highway safety is something that affects us all directly, and yet many misconceptions and much carelessness persist among the driving public. In many ways, the philosophical and political issues surrounding mandatory safety belt use laws are the same as those for mandatory helmet use by motorcyclists. At one point, 47 states had mandatory helmet laws, but 26 states have repealed or weakened their laws since 1976. The argument has been made that motorcyclists have a right to put themselves at risk, if they choose to do so. However, not only does not wearing a helmet greatly increase the risk of death and serious injuries, but 63.4 percent of motorcycle injury medical costs are paid for by public funds (*14*). Injuries to motorcyclists are being subsidized by the state. A similar case is being built regarding the absence of effective safety belt use laws. One study (*3*) concluded that mandatory safety belt use laws had saved about 1,300 lives through mid-1987, and that the saving of lives would have been greater if enforcement was tougher and/or compliance with safety belt use laws was more widespread. Another study (*15*) estimates a reduction of 1,100 severe or fatal accidents each year in North Carolina since that state's mandatory belt use law (with primary enforcement) went into effect. Besides saving lives, improved traffic safety behavior would undoubtedly save a percentage of state funds that currently subsidize the medical costs of traffic injuries. An evaluation of 1,364 motor vehicle accident victims in the Chicago area indicated that "safety belt wearers had a 60.1 percent reduction in severity of injury, a 64.6 percent decrease in hospital admissions, and a 66.3 percent decline in hospital charges" (*16*). Furthermore, the "findings demonstrate the significant societal burden of nonuse of safety belts in terms of morbidity and the costs of medical care."

A recent study (*17*) of the impacts of raising the minimum drinking age in Tennessee has some interesting findings of possible application to the safety belt use issue. The Tennessee study included a discussion of the relative contributions to decreased drunk driving among various age groups made by stiffened driving under the influence (DUI) laws, the drinking age law, and extensive anti-DUI publicity and social pressure. Since the true risk of detection and apprehension for DUI is estimated to be less than one in 1,000 (*17*) and application of even strict DUI laws can be uneven (*18*), the latter two influences are important elements in combating drunk driving. Just as we have seen a reversal of the general public's view of the smoking habit lead to a steady decrease in the fraction of our population that retains it, so has society's decreasing tolerance of excessive drinking brought about an improvement in the problem of drunk driving. In the Tennessee study, denying 18 to 20 years olds unrestricted access to alcohol was found to be a clearly superior alternative to allowing that age group to "decide" whether to make responsible decisions. At the same time, groups such as Students Against Drunk Driving and publicity given to DUI convictions offer low-cost options to reach appropriate target groups.

The preceding comments offer ideas for the promotion of safety belt use, even in states where enforcement is minimal or no belt use laws exist. This paper attempts to identify one underlying cause for nonuse of safety belts. The results suggest that multi-behavior educational efforts could be developed. That is, instead of advertisements that target a single behavior (e.g., just safety belt use), perhaps a more effective campaign would target multiple safety behaviors within single educational advertisements. What needs to be changed is a general disposition to take risks while driving, which is in itself made up of a variety of safety behaviors that are interrelated. The data in this paper provide evidence of a possible behavioral basis for different traffic safety-related habits or dispositions on the part of drivers. By identifying target groups for educational efforts and encouraging the general public to realize that nonuse of safety belts is an unwise choice, not a declaration of personal freedom or an acceptable manifestation of sensation seeking, the personal risks and societal costs of such behavior can be reduced.

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