

Compact accident research

Violations of the Rules of the Road

Imprint

German Insurance Association

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Preliminary remarks

Road traffic represents a complex system, and in order to work effectively, this system therefore needs a suitable framework of rules. The rules of the road, in other words all of the rules and regulations that govern conduct on the roads and that have to be observed by road users, have two main purposes: to ensure road safety and ease of use and to identify who is guilty in the event of accidents.

The most important set of rules in Germany are the road traffic regulations (Straßenverkehrs-Ordnung or StVO). These set out how road users are required to behave. The guiding principle is the requirement to show consideration for others pursuant to section 1 of these road traffic regulations (StVO). Other rules governing how road users are to behave are found in the German road traffic act (Straßenverkehrsgesetz or StVG) and German penal code (Strafgesetzbuch or StGB).

Road users must follow the rules of the road; this is an essential prerequisite for road safety.

Content

	Preliminary remarks	2
1	Introduction	4
2	Analysis of the causes of accidents	4
3	Analysis of offenses	5
4	Analysis of the legal aspects	7
5	Survey	9
6	Conclusion	12
	References	13

1 Introduction

A failure to observe the rules of the road can be regarded as either the cause of most traffic accidents or at least a factor contributing to the accident. Measures designed to increase the extent to which the rules are followed are therefore an essential element of strategies to improve road safety.

The prerequisites for developing promising measures are knowledge of both the causes of traffic accidents and the traffic offenses for which people are prosecuted. It is also necessary to consider the extent to which the rules of the road are accepted and how they are perceived by the public. The UDV (German Insurers Accident Research) therefore carried out an interdisciplinary research project to investigate, on the one hand, the relationship between accidents and the penalties imposed for failure to observe the rules of the road and, on the other, the main factors determining whether or not road users follow the rules.

In an analysis of the legal aspects involved, the existing system of monitoring and penalizing drivers for violations is assessed on the basis of both constitutional and criminal law.

2 Analysis of the causes of accidents

Around 290,000 causes of car accidents involving personal injury or serious damage to property were studied. The study was based on the accident data of the German Federal

Statistical Office (Destatis) from the year 2007, in which the mistakes or culpable conduct of road users are described in terms of the accident causes identified by the police.

27 causes that were relevant for the purposes of the study and attributable to individuals were selected from the total of 49 entries in the official directory of accident causes and then grouped into 10 groups¹⁾:

- Driving under the influence of alcohol (alcohol)
- Driving under the influence of drugs (drugs)
- Exceeding the speed limit (speeding)
- Driving at an inappropriate speed
- Failure to drive at a safe distance from the vehicle in front (distance)
- Overtaking, passing (overtaking)
- Turning off, turning, reversing, driving in and out (turning off)
- Culpable conduct toward pedestrians.

All groups were assessed with regard to their frequency and the seriousness of the consequences of the accidents.

The results of the analysis of accident causes can be summarized as follows:

- A mere five of the 27 causes studied were responsible for 89 % of the accidents. These were: failure to observe priority or give way, driving at an inappropriate speed, mistakes when turning off, failure to drive at a safe distance and exceeding the speed limit.
- Taking into account accident frequency and severity, these five accident causes accounted for 74 % of the total accident costs of approximately 10.8 billion euros attributable to all 27 accident causes studied.

¹⁾ Causes that were attributable, for example, to the vehicle (tires), the environment (wet roads, wild animals) or another type of road use (e.g. cycling), for example, were excluded.

Example of a group: Causes 38 to 42 in the directory describe culpable conduct toward pedestrians at different locations (38: at pedestrian crossings, 39: at pedestrian crossings with signals, etc.); these were grouped together in the category "culpable conduct toward pedestrians".

Abbreviated designations for the groups are shown in parentheses.

- The most serious accidents, by some distance, were those caused by drivers exceeding the speed limit. These accidents occur less often than those with other causes but have particularly serious consequences: a high proportion of fatalities and serious injuries.
- Accidents in which drivers are driving at an inappropriate speed just before the accident also tend to have serious consequences.
- Although accidents caused by a failure to observe rules of priority or give way or by turning off, turning, reversing or driving in or out are frequent, their consequences are significantly less serious.
- The number of accidents occurring under the influence of alcohol has dropped significantly in recent decades. Nevertheless, these accidents account for a proportion of total accident costs that is by no means negligible because, although they are rare, their consequences are particularly serious.

Accident cause	Causes of accidents involving personal injury and serious damage to property	Average accident costs
Failure to observe priority or give way (including red lights)	26 %	€ 28.100 per accident
Driving at an inappropriate speed	22 %	€ 50.500 per accident
Turning off etc.	21 %	€ 28.500 per accident
Failure to keep a safe distance	13 %	€ 22.200 per accident
Driving under the influence of alcohol	8 %	€ 46.600 per accident
Exceeding the speed limit	< 2 %	€ 100.000 per accident

Figure 1:
Overview of the results of the analysis of accident causes

3 Analysis of offenses

In Germany, traffic offenses are dealt with under regulatory or criminal law, with or without additional penalties. Most traffic offenses are dealt with as regulatory rather than criminal offenses.

The rules of the road are very complex and enforced almost exclusively by prosecuting people for regulatory offenses. The main penalty available under regulatory law is the fine, the level of which depends on the seriousness of the violation. Offenders are prosecuted in accordance with the standard penalties specified in the German catalogue of fines, which is applicable throughout Germany and was put in place by the Federal Ministry of Transport, Building and Urban Affairs by a regulation (BKatV) on the basis of section 26a of the road traffic act (StVG). The catalogue specifies fines of 5 euros to 35 euros for minor violations and fines of up to 3,000 euros covering all of the violations included in the catalogue. The fines vary in order to meet the requirement for proportionality between each violation and the corresponding fine. A driving ban (additional penalty) of up to three months may be imposed pursuant to section 25, paragraph 1 of the road traffic act (StVG), and a driving ban is also specified in the catalogue of fines for more serious violations. An additional penalty is imposed for many violations on the basis of the penalty points system of the central German traffic register, which can result in a range of punishments for road users who repeatedly offend, the most serious of which is disqualification from driving (confiscation of the driving license).

Only a few, particularly serious violations on the road are dealt with under criminal law. Society thus indicates to the perpetrators that their behavior in these cases is completely unacceptable and prosecutes them for serious

wrongdoing. Section 315c of the German penal code (StGB) provides an example: the offence described in paragraph 1 (1) is unfitness to drive as a result of intoxication or a mental or physical problem (e.g. overtiredness). Paragraph 1 (2) describes seven concrete traffic violations. The traffic violation must also be committed in a reckless manner that completely disregards the rules of the road. In addition, the violation must have specifically endangered another person or posed a concrete threat to a significant material asset. It must therefore have caused at least a "near-accident". The types of penalty available under criminal law are fines and imprisonment.

Under regulatory law, the actual penalty imposed is determined on the basis of the catalogue of fines and the nature of the offence. Under criminal law, it is determined in court, taking the offender's circumstances into account. Regulatory law takes a general approach to deterrence. The aim is not to criminalize offenders; instead, it is merely to make it clear to them and others that the rules must be followed. Criminal law, on the other hand, is designed to put wrongs right and thus takes a specific approach to deterrence.

The central traffic register of the German federal motor transport authority (Kraftfahrt-Bundesamt) records all violations of the rules of the road (offenses), regardless of whether or not they are associated with an accident. The analysis in this study is based on new reports/entries²⁾ in relation to regulatory and criminal offenses of car drivers in the year 2007. Taking into account the correspondence between the offences in the central traffic register and the Destatis accident causes, it was possible to analyze around 3.62 million reports.

The most important findings are:

- Around 98 % of the entries in the central traffic register are traffic offenses covered by regulatory law (approx. 3.53 million reports).
- Criminal offenses thus account for only around 85,000 entries, of which around 81,000 (95 %) are attributable to driving under the influence of alcohol.
- 21 % of the central traffic register reports on traffic offenses relate to the five most important accident causes.
- By far the highest percentage of entries (77 %) is accounted for by speeding offenses (exceeding the speed limit).
- Driving under the influence of alcohol is the offense penalized most severely. The average number of penalty points imposed for this in the central traffic register is 5.7. Half of the alcohol-related offences are penalized with two to four points and half with five to seven points.
- The offenses of driving at an inappropriate speed and failure to observe rules of priority or give way follow with three points each. Drivers receive an average of two points for each of the regulatory offenses of failure to drive at a safe distance from the vehicle in front and exceeding the speed limit.
- Driving bans and driving disqualification (licence confiscation) are used to a significant extent for offenses where drivers are unfit to drive.

The frequency with which offense types are detected by means of monitoring measures varies, some of them are detected only with difficulty or not at all (driving at an inappropriate speed cannot be monitored when traffic is flowing and is generally deduced from accident analysis, whereas exceeding the speed limit can be monitored virtually anywhere in the road network), and it is not possible to make a connection to

2) This is based on the catalogue of offences of the federal motor transport authority (KBA), which contains over 120 code numbers for traffic violations

Offense type/ accident cause	Percentage of offenses	Average severity of penalty ³⁾
Failure to observe priority or give way (including red lights)	11 %	3,1 points
Driving at an inappropriate speed	< 1 %	3,0 points
Turning off etc.	2 %	2,2 points
Failure to keep a safe distance	3 %	2,3 points
Driving under the influence of alcohol (or other drugs)	4 %	5,7 points
Exceeding the speed limit	77 %	2,0 points

Figure 2:
Overview o the results of the analysis of offenses

the speed at which drivers were driving in reports on criminal traffic offenses such as injury caused by negligence⁴⁾. Nevertheless, it is still possible to make statements about the connection between actual accidents and the penalties imposed. Here are some selected results:

- Offenses relating to fitness to drive (driving under the influence of alcohol or other drugs) are subject to significantly more severe punishment than offenses committed while using the roads (failure to observe the speed limit).

- There is no connection between total accident costs and the average number of penalty points in the central traffic register.
- It is also not possible to identify a connection between total accident costs or average accident severity and the level of fines.
- There appears to be a connection between total accident costs and the average length of a driving ban for driving under the influence of alcohol.
- There appears to be a connection between average accident costs and the average number of points for accident causes in connection with fitness to drive.

4 Analysis of the legal aspects

The state is required by article 2 (2) of the German Basic Law to protect every individual's right to life and physical integrity. This obligation has to be met on several levels: through granting individuals and vehicles permission to use the roads, road construction and design and traffic management and monitoring. It is a constitutional requirement to monitor adherence to the rules of the road contained primarily in the German road traffic code and impose penalties for traffic violations in the interests of general deterrence.

The authorities can certainly be regarded as successful in fulfilling this obligation. The number of road fatalities reached a peak in

3) The average penalty level is the average number of points in the central traffic register. Under the German penalty points system, five to seven points are imposed for criminal offenses and one to four points for regulatory offenses.

4) Reports on criminal traffic offenses such as involuntary manslaughter or injury through negligence (and thus also the associated penalties) are not contained in the data, since they are not subdivided by types of culpable conduct in the central traffic register statistics. It is thus not possible to identify whether a criminal offense was caused, for example, by inappropriate speeding or an overtaking maneuver. In view of this, the analyses essentially focus on regulatory offenses, although, in the case of some types of culpable conduct (e.g. overtaking, speeding), a small number of criminal offenses are involved. An exception to this are criminal offenses due to driving under the influence of drugs or alcohol or with other mental or physical problems, since here the offense still remains a criminal offense under certain circumstances even if it remains without consequences. For example, driving under the influence of alcohol is treated as a criminal offense in principle as of a blood alcohol content of 1.1 permille (by mass) even if there is no accident.

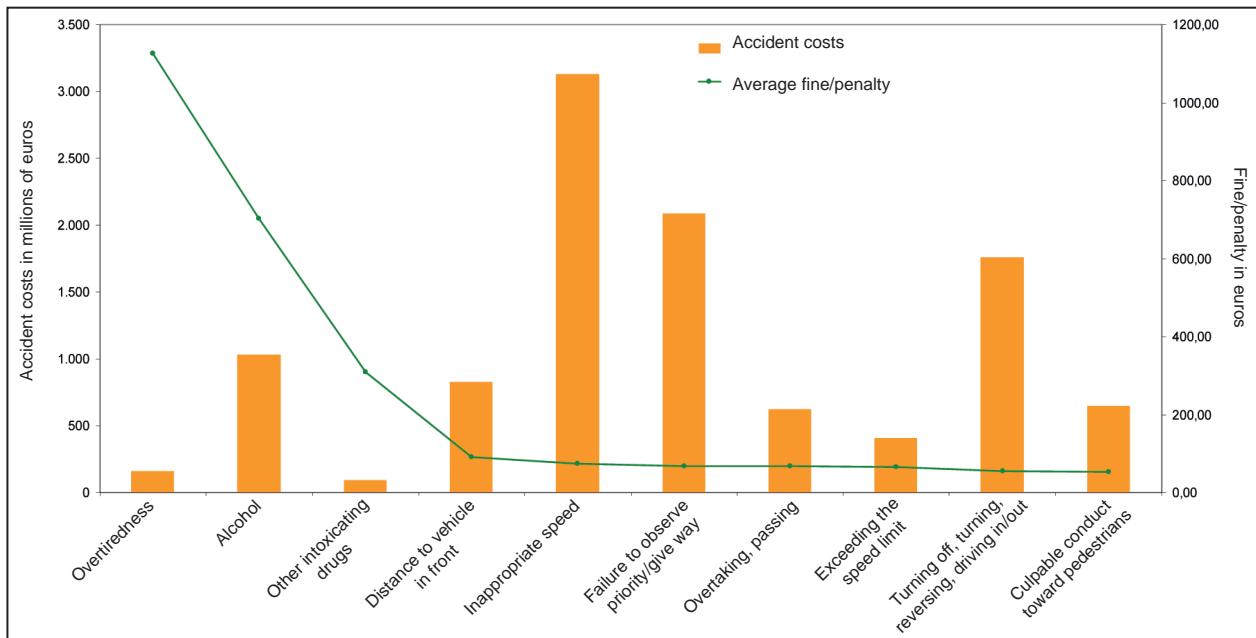


Figure 3:
Accident costs and fines in 2007 by type of culpable conduct

the 70s (over 20,000 fatalities a year), but since then there has been continuous improvement despite a rise in the number of accidents. The number of road fatalities has now dropped to well under 4,000 (3,648 in the year 2010).

While the authorities can therefore be said to have basically fulfilled their constitutional obligations, the overall picture is still not acceptable. No new technology or new transport system would now be permitted if it was known that it would cost several thousand people their lives in Germany every year. Further measures are therefore required by the Basic Law to bring about continuous improvement in the situation.

The subdivision of traffic offenses into regulatory offenses and criminal offenses is believed to be appropriate because it adheres to the principle of proportionality. The roads are generally accessible to everyone, and whenever we use them we have opportunities to violate the rules of the road. On an everyday basis, ordinary

people get into situations in which it is possible for them to endanger, injure or even kill other people. Road traffic is thus a situation in which any road user might commit an offense. That is why frequent traffic violations that are not very socially harmful are dealt with merely as regulatory offenses, and only serious traffic violations are treated as criminal offenses.

- In order to achieve its desired effects, criminal law must therefore be designed in such a way as to be applicable only to forms of culpable conduct that are very socially harmful. However, it is necessary to examine which traffic violations are so serious that they should, on the one hand, be included in the penal code and, on the other, be treated appropriately by the courts and in such a way as to take into account changes in society's values. Up to now, the verdicts passed on people committing criminal traffic offenses have been milder than on those committing criminal offenses such as robbery or aggravated theft. Commonly used terms ("traffic offender" as opposed to "cri-

minal") make this clear. On a continuum from serious to minor offenses or from rare to frequent offenses, traffic offenses are still regarded as being among the most minor and most frequent offenses according to current criminological thinking, although criminal traffic offenses cause injuries and damage far in excess of other registered criminal offenses. Taking into account the findings of the analyses of accident causes and offenses, two improvements should be considered for violations that have particular relevance for accidents:

- Revision of the catalogue of fines
- Reform of paragraph 315 of the German penal code (StGB)
- Owner liability (similar to the obligation to bear the costs for offenses in stationary traffic pursuant to section 25 of the German penal code (StVG)). There should be permissible legislative options that do not violate the constitutional principle of no punishment in the absence of guilt. The guarantees provided by the rule of law in criminal proceedings are only applicable in a modified form in proceedings relating to fines.
- Linear speed measurement (section control), provided piloting can demonstrate the benefits for road safety. There are no constitutional considerations to take into account that would prevent this from being done, provided data privacy, based on the general rights of individuals, is strictly observed, and the data of road users who have not broken the speed limit is deleted. In addition, it must be clearly specified which sections of road come into consideration for linear speed measurement (section control).

5 Survey

The representative survey of 1,009 respondents was intended to indicate the level of acceptance of specific rules of the road among

the general population. It was also the intention to identify the circumstances that influence whether rules are violated or followed. On the basis of the existing findings from the UDV survey on the atmosphere on the roads in Germany ("Verkehrsklima in Deutschland"), this survey examined the following aspects in depth: exceeding the speed limit, driving through red lights and driving under the influence of alcohol.

From psychological studies of road users, it is known that while knowledge and acceptance of a rule is necessary to bring about the desired behavior in road users, it is not enough. It is assumed that situational factors, habits, social norms as well as the subjective probability of being discovered and the assumed level of the penalty have an influence on drivers' behavior. An attempt was made to represent this "dilemma" by means of concrete scenarios in the survey. The respondents were asked 11 questions about their probable behavior in each of the situations described.

Alcohol scenario:

"Imagine the following situation: you have driven to a party one evening at friends who live some distance from the city, and now you want to go home. You have drunk some alcohol at the party. You suspect that your blood alcohol content is above the legal limit. You can either drive home or call a taxi and collect your car the next day."

Red-light scenario:

"Now imagine the following situation: you are driving along a straight, open, two-lane road and approaching at speed an intersection with traffic lights that have just changed to amber. You can either brake sharply and stop at the traffic lights or accelerate through the intersection even if the traffic lights have changed to red in the meantime."

Speed scenario:

"Now imagine a final situation: you are driving along a normal shopping street. The weather is good, people are walking on the sidewalks to your left and right in order to go to the shops or just do some window shopping. There is not much traffic. You can drive at the speed limit of 50 km/h or take advantage of the lack of traffic and drive at about 65 km/h."

The most important results were as follows:

- Behavior and acceptance

85 % of the respondents were in favor of having a speed limit of 50 km/h within built-up areas. 62 % believed driving about 15 km/h above the speed limit was either entirely unjustifiable or at least questionable (personal norm). On the other hand, one in four of those in favor of the rule would be likely to violate the rule, in some cases with a high probability, depending on the circumstances.

There was a similar picture for driving through red lights: almost 50 % of the respondents would try to drive through the intersection although the traffic lights had already switched to amber. On the other hand, 71 % were in favor of the current rule in the German road traffic code, and 63 % believed violating it would be either entirely unjustifiable or at least questionable.

However, the picture was completely different for driving under the influence of alcohol: 41 % of the respondents were in favor of the current rule, 93 % believed violating it was either entirely unjustifiable or at least questionable, and just under 6 % would still drive under the influence of alcohol. Nearly half of the respondents (47 %) said they were in favor of a complete ban on drinking alcohol before driving.

- Respondents' knowledge of the penalties

The responses about exceeding the speed limit by 15 km/h show that the respondents overestimated the penalty to be expected. The actual fine according to the nationwide German catalogue of fines (BKat) is 25 euros, whereas the average estimated fine was 63 euros. The fine is in the range for minor violations, and thus no penalty points and/or driving bans can be added to it. Nearly half of the respondents believed that an additional penalty of one to three points was to be expected, and 13 % even expected a driving ban. The estimates of the penalties for driving through a red light were relatively realistic: an estimated average fine of 118 euros (BKat: 90 euros), an estimated average two penalty points (BKat: three points) and an estimated average driving ban of 0.8 months (BKat: one month).

Scenario	Percentage of respondents [%]		
	Acceptance of the rule	Violation unjustifiable/questionable	Probability of rule violation
Speed	85,5	62,4	23,5
Red light	70,9	63,1	44,8
Alkohol	41,2	93,3	6,2

Figure 4:
Overview of results with regard to behavior and acceptance

The respondents clearly underestimated the penalties for driving under the influence of alcohol. The average estimated fine was 118 euros, whereas the actual fine in the catalogue of fines (BKat) is 500 euros. The additional penalties are four points and a driving ban of one month. The respondents estimated average additional penalties of only one to two points and a driving ban of 0.8 months, which was quite realistic.

- Respondents' feelings about the appropriateness of the penalties

After the respondents were told what the actual penalties were, they were asked how tough or soft they felt them to be. The responses about driving under the influence of alcohol send a clear message: almost all respondents (96%) felt the penalties for this were tough or very tough, while the penalties for ignoring a red light were felt to be tough or very tough by 70%. In contrast, only 13% found the penalties in the speeding scenario to be (very) tough, and half of the respondents indicated that these penalties would either not affect them or hardly affect them.

It is thus necessary to find out what influencing factors (predictors) characterize the

probability of a rule being violated or observed. On the basis of regression analyses, the following predictors were obtained for these three rules of the road that explain the probability of a rule being violated at a level of about 43%:

- Habit is the most important predictor for the rules considered in this study. Much the same applies to situational factors (time pressure, wide road).
- The personal norm ("what do I personally think about this behavior") is also a very important factor determining whether drivers keep to the speed limit or stop at an amber traffic light. In contrast, its impact on the issue of drinking and driving is minor because there is now a consensus in society that you should not drink and drive.
- The probability of being penalized is not relevant for speed and red-light violations, but it does have an influence on drinking and driving. Drinking and driving is socially unacceptable today, whereas until the 80s it was regarded as a minor offense.
- Other predictors such as the perception of risk, the toughness of the penalties or the acceptance of the rules play a relatively minor role in road users' decisions about what they should do.

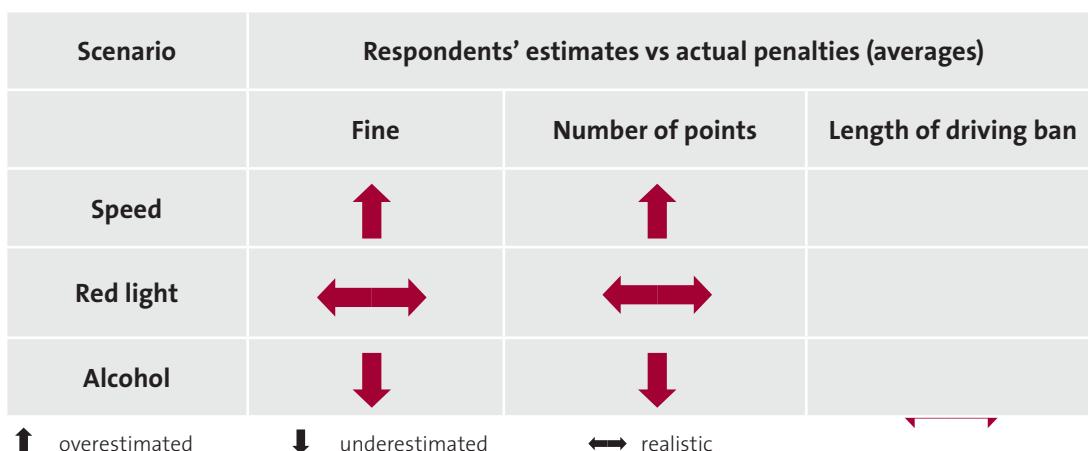


Figure 5:
Schematic overview of respondents' knowledge of the penalties for violations

6 Conclusion

In summary, the implications of the study for road safety are that a public health strategy designed to prevent offenses should concentrate on the five key accident causes, since these account for three-quarters of the costs caused by road accidents.

As far as speed and red-light violations are concerned, measures to make the penalties tougher and increase the probability of detection can be considered as options in order to enforce the rules more effectively, since the measures currently in place do not have a decisive influence on drivers' actions.

Improvements to the law and adjustments to the German catalogue of fines to take into

account the realities of the accidents that are occurring can make a contribution to this. There is still untapped potential in new technologies such as driver assistance systems (intelligent speed adaptation) and improvements to the road infrastructure (self-explaining roads).

In contrast to speeding and red-light violations, drinking and driving is a problem only for a specific sub-group. A lack of self-control and a high probability of repeat offending are significant factors in this case. Consequently, it is necessary to take stronger action here by means of psychological concepts (training in how to handle potentially critical situations). The introduction of a zero-alcohol limit to draw a clear line and stop people drinking and driving and the use of technical aids (alco-locks) can be adopted as preventive measures.

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