Institute of Transport Economics
Norwegian Centre for Transport Research

Summary

«I didn't see him» - Inattention as a factor in fatal road crashes

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Authors: Fridulv Sagberg, Alena Høye, Hanne Beate Sundfør
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Inattention among drivers of motorised vehicles contributed to almost one in three fatal road crashes between 2011 and 2015. This was shown by an analysis of reports from in-depth crash investigations in Norway. About one-third of inattention-related crashes involved pedestrians who were hit by motorised vehicles, where the driver typically detected the pedestrian too late. Failure to check for information in blind zones or behind other sight obstructions is a typical form of inattention. Distraction by use of mobile phones contribute to between two and four percent of crashes, while other sources of distraction, within or outside of the vehicle, contribute to about ten percent. A review of international research literature showed comparable results. Road user inattention is most likely preventable by a system-oriented approach including a combination of vehicle technology, road and road environment improvements, appropriate signs and markings, education and information, and legal measures and enforcement regarding use of mobile phones and other secondary task involvement during driving.

The importance of distraction and other inattention as contributing factors in road crashes has been clearly documented. Some studies have indicated that these risk factors are relatively more frequent in severe compared to less severe crashes. Therefore, the main purpose of the project presented in this report is to investigate the prevalence of inattention in crashes with high severity.

The concepts of inattention and distraction as used in this report imply that distraction is one of several factors that can contribute to a person being inattentive. Thus, when we use the concept inattention, it includes distraction as a possible cause.

The project included four parts:

1) Analysis of data from the crash investigation teams of the Norwegian Public Roads Administration (NPRA). The data consist of both a database and detailed reports from each crash.

2) Overview of databases in other countries, with a focus on describing to what extent information about distraction and other inattention is included.

Analysis of the fatality crash database

We did a preliminary analysis of fatal crashes for the period 2005-2015 where we identified possibly inattention-related crashes, based on the following variables coded in the database:

- Insufficient information collection
- Party driving
- Mobile phone
- Music player
- In-vehicle distraction
- Roadside distraction
- Radio tuning

- Sight obstruction
- Cluttered road environment
- Complex traffic situation

Crashes where one or more of these factors were coded as present were compared to the remaining crashes with respect to various road user and crash characteristics.

Possible inattention, as defined by the variables listed above, was coded most frequently for bicycles and buses and least for heavy vehicles and pedestrians.

Road users with these conditions present are on average older than the others, except for party driving and mobile phone, where the average age is younger. Mobile phone is the type of attention with the highest share of female road users.

Mobile phone and party driving are present far more frequently among drivers under the influence of alcohol or drugs; party driving being coded almost exclusively in combination with drunk driving.

The inattention indicators are present less frequently in crashes where speeding was coded as a contributing factor, whereas mobile phone and party driving are more frequent in speeding crashes.

One or more of the mentioned indicators were present in 39% of all crashes. Some of the indicators are, however, somewhat uncertain regarding actual presence of inattention. In order to get more detailed knowledge about the prevalence of specific types of inattention, in the next phase we examined the reports from individual crashes.

Examination of crash reports

All reports where any of the above-mentioned possible indicators of inattention were present in the database, were examined. A coding scheme was developed, based on previous research, to allow more detailed coding compared to what was available in the database. Information in the reports was used to determine to what extent inattention had contributed to the crash, what attention mechanisms that were involved, and the probability that the factor had contributed (possibly vs. probably or certainly).

We examined reports for the years 2011 through 2015. Crashes involving alcohol or drug influence for the at-fault driver were not included in the analyses. For some of the crashes our judgment was that the at-fault driver had not been inattentive or that there was no clear indication that inattention could have contributed. These crashes were also not included. Finally, 163 crashes remained where inattention possibly, probably or certainly had contributed. Three of these involved only cyclists (and a pedestrian), whereas the remaining 160 crashes involved at least one motorised vehicle.

One or more indicators of attention were identified as contributing factor in 29.4% of crashes. The most frequent inattention category was *failure to look*, which means that the driver/rider failed to look or scan for potentially safety-critical information. This category comprised about 1/3 of all inattention-related crashes. The next most frequent categories were *looked but failed to see,* and *insufficient attentional effort*, which means low concentration on traffic; this category also includes *cognitive distraction*.

Typical crashes were failure to look contributed included situations where an at-fault driver did not see the other road user due to a failure to check blind zones, mirrors or possibly a backing camera screen. A large share of these crashes involved a cyclist or pedestrian being hit while in the vehicle's blind zone.

Vulnerable road users were involved also in many of the other types of crashes where an at-fault driver was judged to have been inattentive. In one-third of inattention crashes a pedestrian was killed.

In several crashes between a motorised vehicle and a vulnerable road user, inattention or carelessness on the part of the cyclist or pedestrian contributed to the crash. This was the case for at least 27% of crashes between a motorised vehicle and a bicycle, and at least 12% of crashes between a motorised vehicle and a pedestrian.

For heavy vehicles, drivers under 25 years of age are clearly over-represented in inattention-related crashes. This result indicates the importance of experience for mastering traffic situations which impose particularly high demands on attentive driver behaviour, e.g., due to blind zones around the vehicle.

Regarding specific sources of in-vehicle distraction, use of mobile phones is the most frequent category, with a share of between two and four percent of fatal crashes. In most cases a handheld phone was used. Five crashes (out of a total of 22 phone-related crashes) occurred during reading or sending text messages. Previous research indicates that this may be the most risky use of a mobile phone during driving. The remaining sources of distraction contributing to most crashes were use of technical systems in the vehicle (GPS, laptop or tablet computer, video camera, backing camera, etc.) and interaction with passenger(s). In-vehicle distractions other than mobile phones contributed to a total of 5.5% of crashes. In 26 out of 30 such crashes, the distracted road user was a passenger car driver.

In addition, there were seven crashes where the driver was distracted by objects or events external to the vehicle.

The share of inattentive drivers in pedestrian crashes was estimated at 67%. In intersection crashes the share was 71% and "same direction" 62%. For head-on and driving-off-the-road crashes, the prevalence of inattention was considerably lower, with 16% and 11%, respectively. For head-on crashes there was, however, a difference between heavy and light vehicles, implying a higher proportion of inattentive drivers for heavy vehicles than for passenger cars.

The proportion of inattention crashes is lower during weekends (Friday – Sunday) than during weekdays, which means that other contributing factors are more prevalent during weekends.

In crashes on straight road sections, inattention contributes to a far larger share of crashes than crashes in curves (42% vs. 18%). Furthermore, inattention contributes more frequently to crashes in intersections and private entrance roads (63%) than in other crashes.

Regarding light conditions, we found that the proportion of inattention-related crashes was highest in darkness with road light (42 %) and lowest for darkness without road light (14%). The share of inattention-related crashes is significantly larger on roads with a speed limit of 50 km/h or lower, compared to roads with a speed limit above 50 km/h. In concordance with this, the share is higher in urban (55%) than in rural (22%) areas.

We do not find any relationships between inattention-related crashes and season, weather and road conditions, number of lanes, or presence of a median.

Databases from other countries

The project included preparation of an overview of databases in other countries regarding high-severity crashes, with an emphasis on to what extent various types of inattention are coded in the databases. A total of seven databases were described, and most of them contain fairly detailed information about inattention as contributing factor in crashes. These databases could be a useful supplement to our national data on fatal crashes in future research both on inattention and other risk factors in traffic.

The review included the following databases:

- The extended fatal crash statistics – DUS (Denmark)
- The in-depth study client (Sweden)
- In-depth on-the-spot Road Accident Investigation (Finland)
- The German In-Depth Accident Study – GIDAS (Germany)
- The Australian National Crash In-depth Study – ANCIS (Australia)
- On-the-spot (OTS) Road Accident Database (UK)
- Fatality Accident Reporting System – FARS (USA)

International research

The literature search showed that there are few international studies where the proportion of inattention as contributing factor is estimated for fatal crashes. The available estimates vary a lot, but on the average they seem to be roughly in the same order of magnitude as ours, to the extent that the studies are comparable to our study. For example, a USA study which was comparable to our study found a share of inattention of 29,9% in fatal crashes. Another USA study reported a share as high as 33%; this study, however, includes only single-vehicle crashes and thus is not quite comparable to ours. Most other studies report somewhat lower proportions than what we find, which may partly due to the inclusion of less severe crashes in addition to fatal crashes. Another explanation may be different definitions of inattention. The fact that we included insufficient check of blind zones and other view obstructions as a type of inattention may have contributed to higher estimates than in some other studies. On the other hand, some studies have included fatigue-related inattention, which is excluded in our study. The 35 crashes with sight obstruction or blind zones in our study make up about 6% of all crashes, so even without including these crashes, the share of inattention-related crashes would be above 20%.

Some studies report that inattention in general contribute far more frequently to fatal than to less severe crashes. This seems, however, to depend on type of inattention; for example, in-vehicle distractions seem to be associated with more severe crashes, compared to external-to-vehicle distractions as well as to cognitive distraction.

Possible countermeasures against inattention in traffic

Concerning countermeasures against inattention among drivers and riders, vehicle-related measures are probably the most effective category. Examples include design of information and communication systems in a way that minimises the mental load on the user, support systems making it easier to collect safety-critical information, as well as apps or other systems that prevents or regulates unsafe use of mobile phones and other potentially distracting equipment while driving. Some more specific examples are:

- Warning systems to help heavy vehicle drivers detect road users in blind zones
- Mobile phones with "driving mode", which e.g. blocks text messaging
- Increased use of pedestrian-activated emergency braking systems (while carefully considering possible negative side effects)
- Improved viewing conditions by vehicle design, e.g., by thinner (or transparent?) A columns, and improved seating position
- Prohibiting placement of view-obstructing objects in the vehicle cabin, possibly combined with increased police enforcement

Improved road and road environment may also contribute to preventing inattention. Sufficient sight distances, absence of disturbing elements (e.g. conspicuous advertising boards) along the road, clear and unambiguous signs and markings, as well as clear information about right of way are important measures. Right-of-way regulations should be consistent with the visual design of the road (major vs. minor roads).

Finally, some studies indicate that measures addressing road user behaviour, such as education and information, can contribute to preventing specific types of inattention. Such measures are probably most effective when combined with police enforcement, like e.g. controlling the use of handheld mobile phones during driving.