

Voluntary risk taking and skill deficits in young driver accidents in the UK

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Abstract

In absolute terms, young drivers have three to four times as many accidents per year as older drivers; and even allowing for their relative numbers in the population, their accident involvement is about 2.5 times higher than older drivers.

A sample of 3437 accident reports was considered, including 1296 in detail, from midland police forces in the UK, involving drivers aged 17–25, and covering the years 1994–1996 inclusive. Four types of accident were identified as being of particular concern due to their high frequency: ‘cross-flow’-turns; rear-end shunts; loss of control on bends; and accidents in darkness. (The term ‘cross-flow’ is used in relation to turns to denote an intersection accident where a driver is turning across the path of oncoming traffic, i.e., left turns in the US and continental Europe, but right turns in the UK and other countries where driving on the left side of the road is the norm.)

An examination of driver risk taking behaviours as revealed in police interviews gave an insight into some of the motivational factors underlying young driver behaviour. Young driver accidents of all types are found to be frequently the result of ‘risk taking’ factors as opposed to ‘skill deficit’ factors. It had previously been thought that one of the main problems that young drivers have is in the area of specific skills needed in the driving task. However, it appears that a large percentage of their accidents are purely the result of two or three failures resulting from voluntary risk taking behaviour, rather than skill deficits per se. It is shown that specific groups of young drivers can even be considered as above average in driving skills, but simultaneously have a higher accident involvement due to their voluntary decisions to take risks.

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1. Introduction

Road accidents are the most common cause of death among those aged under 25 in the USA, Canada and the European Union. Forsyth (1992) quotes figures from the UK in 1987 that show male drivers between the ages of 17 (the minimum age of licensure in the UK) and 20 having an average of 440 injury accidents per 100 million km driven. The average for all male drivers was 106 injury accidents. Comparable figures for female drivers in this age bracket were 240 versus 125 injury accidents per 100 million km driven. Everett et al. (2001) examined national trends in transportation related injury risk and safety behaviours among US high school students, and found that many young people place

themselves at unnecessary risk from motor vehicle and bicycle related crash injuries and fatalities because of drink driving and improper use of safety equipment such as seat-belts.

Accident rates appear to drop rapidly above the 17–20 age bracket. Figures for male drivers in the age range 20–24 years, for example, show a drop to 180 injury accidents per 100 million km driven. While this is a massive drop, it still represents an injury accident rate that is nearly 70% higher than the baseline for all male drivers.

The focus of this study was on four main problem areas in young driver accident involvement: intersection turn accidents; accidents on bends/curves; rear-end shunt type accidents and accidents occurring during the hours of darkness. Certain contributory factors are known to be common in all young driver accidents, and one of these, speeding, is discussed here first followed by a summary of research on the

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four types of accidents to be examined, and a brief overview of research methodology.

Younger drivers have long been associated with offences and a variety of accident types involving *speeding*. Nationally gathered 'STATS19' data (covering all recorded UK injury accidents) for 1995 shows that the importance of speeding as a contributory factor in injury accidents declines steadily with age.

Speeding was by far the most common offence for young male and female drivers in the UK Cohort study by Forsyth et al. (1995) and there also appeared to be an increase in the number of speeding violations as a whole over the first three years of driving. Forsyth et al. suggest that this is a result of increasing driver confidence as initial driving experience is gained after passing the test.

Corbett (2003) has noted that young male drivers seem particularly motivated to commit speeding offences by intrinsic enjoyment of fast driving. The work of both Parker (1991) and Tuohy and Stradling (1992) showed the importance of such internal motivational factors in an understanding of the young driver problem. Parker (1991) found that speeding in younger drivers was often also mediated by the effects of peer groups and significant others, resulting in the young driver having a perceived lack of control over violations such as speeding. Similarly, Tuohy and Stradling (1992) surveyed the knowledge and beliefs of both young drivers and 'pre-drivers', and concluded that both groups had a good knowledge of basic roadcraft: Young drivers knew what was the correct behaviour, but attitudes, opinions and beliefs usually stopped them practising it.

It has been suggested, e.g. by Brown (1982), that one of the reasons young drivers attach less importance to the risk of speeding is they are overconfident in their control and recovery skills. Brown concludes that "... relatively naive drivers tend to create accident opportunities for themselves because they often overestimate their ability to recover from error". It has also been pointed out by Deery (1999) that psychological research separate from the road safety area suggests that people are generally overconfident about their skilled performance, and that in addition, speeding can result from young males especially having a higher degree of risk acceptance while driving than that found in older drivers.

A large US study by Treat et al. (1979) that involved over 400 in-depth analyses revealed the hitherto unappreciated role of visual search at *intersections*. In a UK study, Clarke et al. (1998) discovered that young drivers (under the age of 25) were more than three times more likely to be involved in right turning accidents (either onto or off a more major road) than typical mileage travelled each year by this age group would lead one to expect (note that a right turn in the UK, where road-users drive on the left, is equivalent to a left turn in the US and most other countries).

Research on intersection accidents has often focussed on 'looked but failed to see' accidents, e.g. Brown (2002), who

suggested a number of psychological factors that could contribute towards such errors. Similarly, perception experiments by Mack and Rock (1998) have shown that subjects may be *less* likely to perceive an object if they are looking at it directly than if it falls outside the centre of the visual field, a phenomenon which they call 'inattention blindness'.

When the type of manoeuvre in UK aggregate national records is examined, it can be seen that younger drivers (17–19) are involved in twice the proportion of accidents while negotiating a *bend* that older drivers are (in this example, those aged 30–39). This is a feature associated with the over-representation of younger drivers in single vehicle accidents (as shown by Maycock, 1991).

Rear-end shunts, where a vehicle runs into a slower or stationary vehicle ahead, have been found to be amongst the most common type of accidents for all drivers. West and French (1993) estimated that at least 30% of all accidents on UK roads were shunts. While many of these accidents are seemingly trivial, whiplash injuries that can result from them are a significant problem. Treat et al.'s (1979) study showed that forms of inattention in car following were prime contributors to such accidents.

Accidents for all drivers per unit distance travelled are much higher during the hours of *darkness* than during the daylight. It is possible that the problem of increased young driver accident involvement during the hours of darkness is caused by the purposes for which young drivers are on the road during these hours. These include driving for social purposes and 'driving for pleasure', both of which younger drivers do more than other groups of drivers (Stradling and Meadows, 2000). Driving is viewed as an expressive activity by many young drivers, and is often a significant leisure activity for many.

The causality of real road accidents can be a difficult phenomenon to study. One possible solution to this is the use of methodology that investigates road accidents after they have occurred, rather than the more familiar psychological research that relies for its method on examination of driver behaviour in a controlled environment. Many studies have used in-depth techniques applied to secondary data sources such as police reports, interviews and questionnaires, e.g. Malaterre (1990), who showed that precise analysis can be carried out by referring to complete police accident reports, with all their varieties of information.

Case study methods were used by Clarke et al. (1998) in a study of overtaking ('passing') accidents and placed an emphasis on the interpretation of causal patterns by the human coders, and used the powers of a computer database for later stages of analysis. It was found that such an approach was particularly suited to revealing drivers' *risk taking behaviours* (primarily in interviews and witness statements), as well as *skill failures* in accident involved drivers. It was hoped in the current study that this method would be able to examine and quantify the differing contributions to the causation of the four types of young driver accident made by these essentially very different groups of factors.

2. Method

Our method relies on the human interpretation of road accident case reports. A pilot sample of 100 cases was drawn from two local police jurisdictions. This sample identified common accident scenarios that could be studied further—the four accident types of ‘cross-flow’ intersection turns, accidents on rural bends/curves, rear-end shunt accidents, and accidents occurring during the hours of darkness. These were also identified as areas of concern by the government transport agency (DTLR) that sponsored the research.

A main sample of 3437 accident reports was considered, including 1296 in detail, from two midland police forces in the UK, involving drivers aged 17–25, and covering the years 1994–1996 inclusive. All cases studied were injury accidents, which it is a legal requirement in the UK to report to the police. The two jurisdictions studied contained roads of mixed urban, suburban and rural type, with speed limits of between 20 and 70 mph (the legal maximum in the UK).

The minimum contained in each file is a report sheet/card, which is a summary of information about the accident such as date, time, location, weather conditions, junction type and many other items. The sheet also includes a brief accident story as interpreted by the attending police officer. It contains the actions, and in some cases the reported intentions and behaviours of drivers and witnesses. In addition to the report sheet/card, the most detailed files contain a range of further items, which help to fill out the often-complex circumstances of the accident. These include maps, photographs, and statements of vehicle examiners and, perhaps most importantly, interview and witness statements, which are rich in information. The interpretation consisted of the reconstruction of an entire accident story from the information available in the police file.

The data were entered into a FileMaker Pro database customised to handle the information and search parameters required for this project. Data were entered describing the relatively objective facts of each case: time of day, speed limit, class of road, etc. A ‘prose account’ is also entered for each case giving a step-by-step description of the accident. The causal story is always written from the viewpoint of the young driver, who is labelled as ‘driver 1’, though much consideration is also given to other drivers’ actions and intentions. An interest is taken in all accidents involving the young driver, regardless of blameworthiness. The prose accounts give a detailed summary of the available facts, including information from witnesses that appears to be sufficiently reliable. Discrepancies can occur between the interviews of drivers and the statements of independent witnesses, but these can usually be resolved by considering all statements together with various other reported facts. These can include measurement of skid marks by police, vehicle damage reports, etc.

A minimum set of possible explanations for each accident is recorded from a standard checklist adapted and developed from a previous study (Clarke et al., 1998). The list has subsections for the road environment, vehicle and

driver characteristics, and specific driver actions. The emphasis throughout is on giving the finest grain description possible of each accident, not for use as a formal coding scheme, but rather to provide search and selection aids to identify homogeneous groups of cases for further qualitative analysis. Finally, entries are made in additional fields for comments and quotes from involved drivers, taken from interview transcripts, which are often revealing of drivers’ voluntary risk taking. Statistical examinations were not the primary focus of the study, even though simple statistics were used to characterise the sample. The reliability of coders’ interpretation of cases using this structured method has been previously found to be good in a similar prior study (Clarke et al., 1998).

3. Results

3.1. Voluntary risk taking versus skill deficits

An investigation was attempted of the division between contributory factors in accidents that were primarily about drivers’ *risk taking behaviour*, and those that were apparently concerned with *skill deficits*. In the case of voluntary risk deficits, accidents were deemed to be caused by behaviours which could be changed at will, if the driver chose to do so or was sufficiently concerned or conscientious about that aspect of the driving task. In the case of ‘skill’ deficits, the accident outcome could only be changed by acquiring driving skills which were (presumably) not present in the accident examined. It has often been assumed that the problem of young drivers is primarily one of the skill deficits, whether in high or low level skills. However, our results indicate that a fair percentage of young driver accidents result from drivers’ voluntary risk taking, rather than any particular failure of skill.

The analysis therefore attempted to separate risk taking and skill factors that had been identified throughout the course of the study. Table 1 shows the most frequent risk taking behaviours that were found in the study, and Table 2 shows the most frequent failures of skill (with the percentage of each contributory factor occurring in all ‘to blame/partly to blame’ accidents in the database).

It was found that, for all ‘to blame’ accidents, once deliberate voluntary risk taking factors had been removed *cumulatively*, nearly 50% of the accident involvement was accounted for. This occurs no matter which of the four types of accident is examined, but the fall occurs more rapidly for Darkness and Rural bend accidents, a large proportion of which are dealt with by removing the risk taking factors of alcohol, recklessness and deliberate speeding. It is, of course, quite important to note that a large percentage of the remainder (after voluntary risk taking problems are removed) can be accounted for by various driver skill deficits, for example, failure to take account of a restricted view, but this analysis still appears to show that a large number of young driver accidents are caused by voluntary risk taking *alone*.

Table 1
'Voluntary risk taking' factors

Speed (25.92% of 'to blame' cases)	All cases where the driver exceeded the posted speed limit and this was considered a contributory factor in the accident
Alcohol (7.13% of 'to blame' cases)	All cases where the driver has been discovered to be over the legal limit for alcohol as measured in blood or breath sample (80 mg/100 ml of blood, equivalent to 35 µg/100 ml in the breath)
Recklessness (5.62% of 'to blame' cases)	All cases where there appears to be elements of deliberate recklessness, for instance, racing another vehicle, speed of more than twice the posted limit, and so on
Risky overtakes (1.98% of 'to blame' cases)	Risky overtakes; cases involving overtaking against highway code guidelines, for instance, at junction, hillcrests, corners, etc.
Twoc (1.63% of 'to blame' cases)	All cases involving a vehicle taken without the owner's consent
Close follow (1.39% of 'to blame' cases)	Deliberate close following of another vehicle
Light jump or crossing (0.93% of 'to blame' cases)	All cases involving crossing a red light, either at traffic light controlled junctions or pedestrian crossings

It is also important to note, when splitting any given group of accidents by voluntary risk taking or skill factors, such as removing all speed accidents, it does not necessarily mean that the same proportion of accidents would "disappear" if the manipulation were to happen in the real-world environment. The removal of one factor may simply reveal the influence of another in the same way that eradicating a disease 'x' entirely in a population might result in a greater mortality from disease 'y'.

3.2. Voluntary risk taking versus skill deficits: young drivers of 'performance' cars

Young drivers that were accident involved in 'performance' cars accident were selected as a subset of the main sample. Using the indexing function of the database, a search pattern on all manufacturer suffixes that appeared to denote cars of above average performance was performed. Two hundred and twenty-one cases were discovered in total, which represents 8.6% of all the accidents where the young driver has been considered as fully/partly to blame.

A series of 2×2 analyses were performed using the Chi-square test, in order to find which voluntary risk taking or skill factors young drivers of performance vehicles might be over-represented in.

Accident involved young drivers of performance cars are more likely to be male, and are more likely than other young drivers to be driving at excessive speed deliberately, or driving recklessly. They are more likely to have taken the car without the owner's consent, but are no more likely than other young drivers to have drunk excessive amounts of alcohol prior to their accident, or run across red traffic lights. There appears

to be no significant differences in the number of accidents involving performance cars across the three age bands studied (17–19 years, 20–22 years, and 23–25 years) in a 2×3 Chi-square analysis, but perhaps this is not surprising as the sample as a whole could be assumed to have a higher than average degree of interest in such cars.

Young drivers of performance cars are no more likely than other young drivers to exhibit any skills deficits in their accident involvement, and indeed, indications are that, on two of the skill factors examined ('looked but did not see' and 'close follow in ignorance') they are less likely to be represented. They can therefore perhaps be considered as drivers with, if anything, above average skills, but whose voluntary risk taking decisions more than make up for that apparent advantage.

3.3. Voluntary risk taking versus skill deficits: young driver accidents by time of day

Of all the accidents where they are fully or partly to blame, young drivers have 50.4% of their accidents during the hours of darkness in this sample. Table 3, below, shows the percentage of total accidents involving various specified contributory factors for different driver groups that emerged from the study. Figures show percentage of accidents involving the specified factor where the young driver was judged primarily at fault, for all accidents occurring during the hours of darkness. The reliability of researchers' assignments of factors in this manner had been assessed in a previous study (Clarke et al., 1998). The mean 'similarity' score developed in this study, where subjects compared two independent coders as to the similarity of their assessments, was 82.8%.

Table 2
'Skill' factors

Looked but did not see (18.83% of 'to blame' cases)	All cases involving a lack in continuity of observation on the part of the driver
Ignorant of correct speed (12.28% of 'to blame' cases)	All cases where the driver appeared to be ignorant of the correct speed for conditions; inside the speed limit, but still too fast for wet road conditions, bends, and so on
Close follow in ignorance (9.14% of 'to blame' cases)	All cases where the driver appears ignorant of the correct stopping distance when following a vehicle, for instance, the increased following distance needed on a wet or icy road
Restricted view (7.59% of 'to blame' cases)	All cases where the driver has failed to take into account of a restricted view before making a turning manoeuvre
Distracted (4.12% of 'to blame' cases)	All cases where the driver has become distracted by something inside or outside the vehicle
Not looked in relevant direction (3.76% of 'to blame' cases)	All cases where the driver has not looked in the relevant direction at all

Table 3

All accidents occurring during the hours of darkness, where the young driver is considered fully or partly to blame ($n = 1282$)

Factor (percent in each group)	Male drivers ($n = 1037$)	Female drivers ($n = 244$)	All 17–19-year-old ($n = 488$)	All 20–22-year-old ($n = 443$)	All 23–25-year-old ($n = 351$)
Wet road	25.1	25.4	29.0	24.2	21.1
Excess alcohol	14.0	4.1	9.6	10.8	17.1
Poor observation (all categories)	24.7	35.2	25.2	27.8	27.4
Misjudged speed/distance of other vehicle	5.1	8.6	6.1	4.5	6.8
Overbraking/oversteering	4.5	6.1	6.1	4.5	3.4
Excess speed (limit and conditions)	47.8	23.0	46.1	43.1	39.0
Close following	4.0	6.6	4.5	4.7	4.0
Aggressive recklessness	9.8	1.6	9.0	7.2	8.5

Figures show percentage of accidents involving the specified factor.

Table 4

All accidents occurring during the hours of daylight, where the driver is considered fully or partly to blame ($n = 1263$)

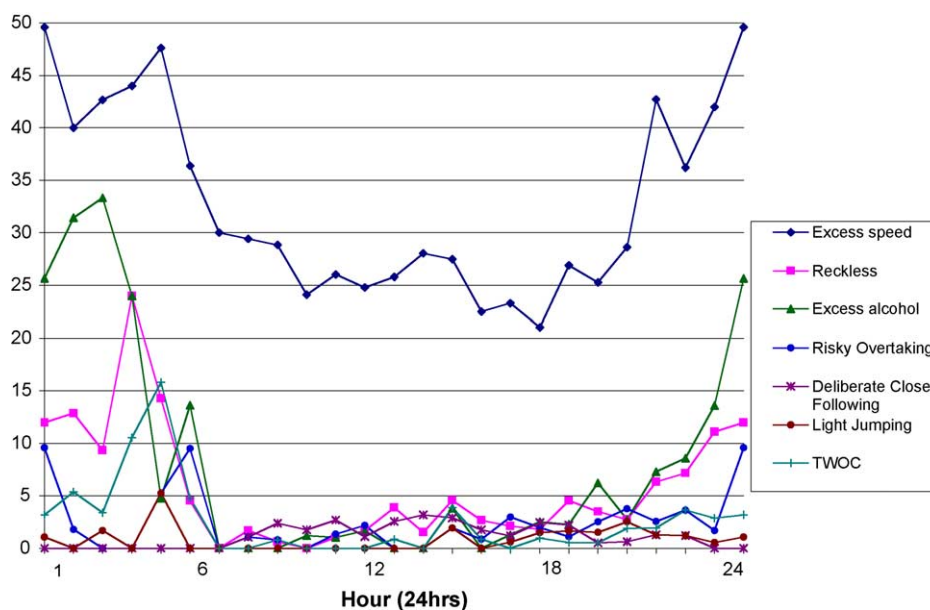
Factor (percent in each group)	Male drivers ($n = 908$)	Female drivers ($n = 354$)	All 17–19-year-old ($n = 405$)	All 20–22-year-old ($n = 443$)	All 23–25-year-old ($n = 431$)
Wet road	23.2	20.3	24.0	21.5	21.8
Excess alcohol	2.3	0.6	1.5	1.9	2.1
Poor observation (all categories)	40.2	44.9	41.5	43.3	39.7
Misjudged speed/distance of other vehicle	5.6	7.6	7.4	5.2	6.0
Overbraking/oversteering	3.9	3.4	5.9	3.0	2.3
Excess speed (limit and conditions)	38.3	19.2	37.0	32.6	29.5
Close following	16.3	17.8	13.6	16.4	20.0
Aggressive recklessness	4.1	0.0	4.0	3.0	1.9

Figures show percentage of accidents involving the specified factor.

Table 4 shows the same thing for the hours of daylight.

Perhaps surprisingly, observational failures taken as a global group are more common in daylight accidents. This suggests that visibility problems caused by darkness itself are not having much effect on these accidents, and that the problem is, again, not so much a matter of skill deficits in young drivers, as with the risk taking factors found in this group. Aggressive recklessness peaks during the hours of darkness, particularly for male drivers, and the younger driver group

(17–19 years). Accidents involving driving while over the alcohol limit are also more likely to occur at night; they are more likely to involve male drivers, and the older driver age group (23–25 years). Accidents involving inappropriate or illegal speeding show an increase in the hours of darkness, particularly for male drivers. Accidents caused by close following decline markedly at night, perhaps due to lower traffic volumes. The high incidence of wet roads as a factor in accidents occurring under both lighting conditions is almost

Fig. 1. Proportion of young drivers 'to blame' ($n = 2851$) accidents involving specific 'attitudinal factors' by time of day.

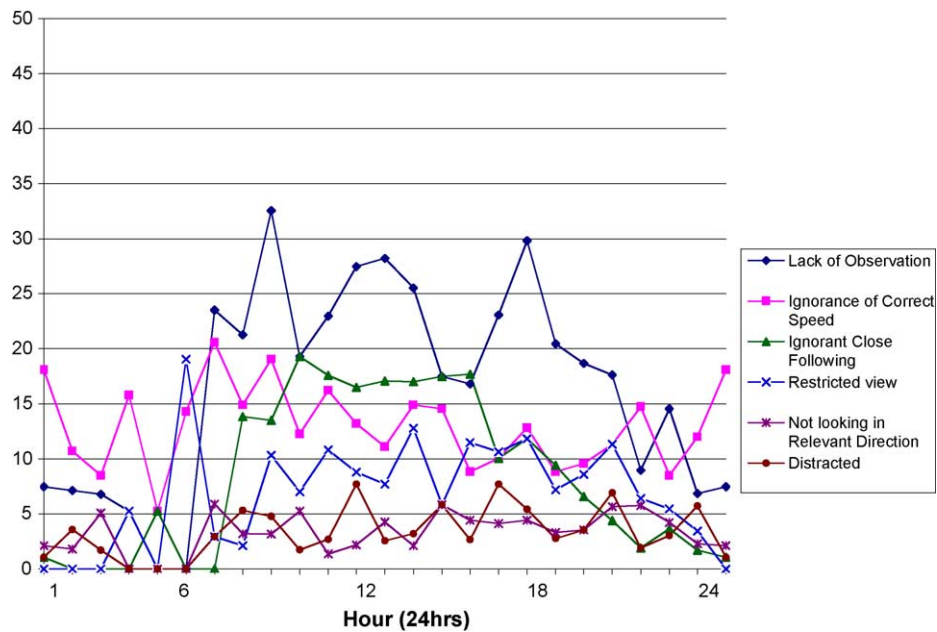


Fig. 2. Proportion of young drivers 'to blame' ($n=2851$) accidents involving skill factors by time of day.

certainly due to the set of accidents being studied, i.e. rear-end shunts and 'loss of control on bend' accidents are more likely to occur in slippery conditions. If we examine the proportion of accidents involving the 'risk taking factors' identified earlier (Table 1) by time of day, the following diagram is produced.

Most 'risk taking' factors in Fig. 1 (above) peak during the hours of darkness. A similar plot (Fig. 2, below), showing the proportion of the 'skill' factors from Table 2 reveals that the proportions either peak during the day instead, or remain more or less constant independent of the time.

It is important to note, however, that the curves do not take account of the differences in total accidents over the hours of the day. So, while half of the midnight accidents involve alcohol, the small number of drivers and accidents at that hour mean a small proportion of total accidents in the database.

The evidence seems to point to the fact that the problem of increased young driver accident involvement during the hours of darkness is not caused by darkness per se, but rather the purposes for which young drivers are on the road during these hours and the manner in which they drive while there. These include driving for social purposes and 'driving for pleasure', both of which younger drivers do more than other groups of drivers (Stradling and Meadows, 2000). Driving is viewed as an expressive activity by many young drivers, and is often a significant leisure activity for many. Darkness seems, therefore, not to be especially dangerous in itself, rather it is the young drivers' reasons and attitudes towards driving in the evening that put them at an increased risk of having an accident. Deliberate speeding, recklessness, and excessive alcohol consumption seem to be the main problems for young drivers travelling during the hours of darkness.

4. Conclusion

It seems the central difference is between accidents that are caused by voluntary risk taking factors, rather than skill deficits. In particular sub-groups of young drivers, e.g. drivers of performance cars, this difference is especially marked. Such drivers have, if anything, higher than average control skills, but this is more than offset by their risk taking decisions.

Accidents in the dark might be expected to arise from problems of visibility. We find this not to be generally true. The hours of darkness are not only a time of reduced visibility and artificial lighting, they are also a *time* quite unlike mornings and afternoons, when different groups of road-users are about, travelling for different reasons and in different ways. To a striking degree, the problems of accidents in the dark are *not* a matter of visibility, but rather a matter of who uses the roads at night, and why, and how. There appears to be a high number of accidents associated with 'recreational' driving, or driving in relation to the social life typically engaged in by people of this age group.

For many young drivers, especially males – to judge from those who end up in accident case files at least – driving is fun, challenging, exciting, a way of testing themselves, and a way of showing off. Of course there are limits. Speed, road conditions, weather, traffic, and vehicle performance all combine to produce a 'space'—a part of the multi-dimensional graph describing vehicle, driver, and environment, in which one can move about safely. The safe region has edges. (Test pilots call them 'the envelope', and their job is to find and to 'push back' that envelope when flying new kinds of plane.) Some young drivers seem to think they are test pilots too. Their interest is to find and explore the envelope, or else to assume they know

where it is and to operate on its edges. They talk and behave as if this envelope – the dividing line between accident-free driving and collision – is visible, precise and stable. If that were true, they would get away with what they do, to the extent they were as skilful as they thought. But (to change the metaphor) their voluntary decisions to take risks means that they are prancing on a crumbling cliff, not a hard edge. If it gives way, it will do so without warning, without apparent cause, and without the chance of recovery. No one can tell exactly where the danger zone begins. There is no clear line between safety and catastrophe. And what division there is, is constantly changing. Given that ‘the envelope’ works like that, the *only* requirement is to keep well away from the edge. This is the essential message that we must put across to young drivers.

While some improvements can doubtlessly be made to young driver accident involvement by focussing on issues of skill-based learning and hazard perception, a way to address the deliberate risk taking behaviours of a significant number of young drivers must also be found, if the greatest improvements are to be made.

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