

# **Car accident cause analysis**

**Gregor BARTL & Barbara HAGER**

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**A research project in cooperation with  
the Federal Institute for Traffic**



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## 2. Abstract

2128 standardised face to face in-depth interviews were carried out by 28 psychologists in Austria. 852 accidents were reported (involving material damage and/or personal injury). The main contributory factor to the cause of these accidents was inattentiveness (36%). The main reason for being inattentive was thinking about other things while driving. 14% of all accidents were primarily caused by driving too fast for the specific situation. The main reason for driving too fast was stress, followed by a lack of critical thinking about the speed at that moment in time. Aggressive emotions, risk-taking behaviour etc. did not play a major role. Another 14% of all accidents were primarily caused by inexperience in such specific situations. This factor was found significantly more frequently amongst young drivers. 10% of all accidents were due to lack of proper safety margins to the vehicle in front – also mainly because of stress and lack of critical thinking. Lack of skill caused 7% of all accidents, fatigue was in 5% of all accidents the main contributory factor; alcohol and other reasons were responsible for a further 5%. The remaining risk of 9% were external factors which occurred suddenly and unexpectedly.

Generally speaking, 42% of accidents were primarily caused by emotional states where the driver was not in balance within himself, e.g. stress, sorrow, having problems to solve, etc.

It was observed that the accident risk of novice drivers declines continuously from the beginning of the driving career over the first 36 months.

The risk of having an accident causing personal injury was 12 times higher for young car drivers, 3 times higher for older drivers (early 80s) and 11 times higher for even older drivers (late 80s), when compared to the average age group. These results were gathered from two separate data sources: first, 1000 telephone interviews based on annual kilometres driven and, second, the official road accident statistics for Austria in 2005 concerning personal injuries, as well as the statistics on the distribution of the Austrian population per age group.

The majority of drivers (57%) favours the present speed limit of 130 km/h on Austrian motorways, women more than men. Priority for pedestrians at pedestrian / zebra crossings is favoured by 86% of car drivers. An automatic gear shift is only favoured by 20% of drivers. Women get upset by cars following them too closely, men rather because of cars driving too slowly in front. The two most favoured car colours are black and silver/grey. There are indications that the chance of causing an accident is higher for light red and black cars. Further correlations to accidents were not found.

Accidents correlate positively with kilometres driven. Women show a higher accident risk per kilometres driven (they drive less on average). But men are significantly more responsible for the serious accidents.

Makes of cars are clearly associated with brand images. Alfa Romeo is associated with passion and being different, BMW with power, Jaguar with being rich, Mercedes with calmness in the sense of being relaxed, Audi with almost belonging to the establishment and Volkswagen with social-minded attitudes.

## 1. Kurzfassung

Im Rahmen von 2.128 standardisierten Interviews wurden 852 von den Befragten verschuldeten Sach- und Personenschadensunfälle vertieft analysiert. 36% aller Unfälle waren in erster Linie auf Unaufmerksamkeit zurückzuführen. Die Unfalltenker waren primär wegen Ablenkung durch Gedanken unaufmerksam. 14% aller Unfälle waren in erster Linie auf für die Situation überhöhte Geschwindigkeit zurückzuführen. Die Meisten fuhren wegen Stress und weil sie gedankenlos waren zu schnell. Aggressivität, Risikofreudigkeit etc. spielten eine geringe Rolle. Weitere 14% waren primär auf Unerfahrenheit zurückzuführen. Es folgte zu geringer Sicherheitsabstand als vorrangige Unfallursache mit 10%, ebenfalls in erster Linie wegen Gedankenlosigkeit und Stress. Weitere Unfallursachen waren mangelnde Fähigkeiten mit 7%, Müdigkeit mit 5% und Alkohol sowie Sonstiges mit 5%. 9% blieb Restrisiko im Sinne von unvorhersehbaren externen Unfallumständen.

42% aller Unfälle waren primär durch psychische Zustände, in denen man aus der emotionalen Balance ist, wie Stress, Sorgen, Traurigkeit, Ärger etc. verursacht.

Bei Fahranfängern sinkt das Unfallrisiko von Beginn an kontinuierlich. Der Beobachtungszeitraum betrug für diese Fragestellung 36 Monate.

Die Unfallrate von Personenschadensunfällen bezogen auf Lebensalter, Bevölkerungsanteil und Kilometerleistung ist bei jungen PKW-Lenkern 12 Mal höher, bei Mitte 80Jährigen 3 Mal und bei Ende 80Jährigen 11 Mal höher als beim Durchschnitt der 30 bis 60 Jährigen. Die Datenquellen waren hier 1.000 zusätzliche Telefoninterviews bezüglich der Kilometerleistungen und die Daten über verunglückte PKW-Lenker der Statistik Austria für 2005.

Bezüglich Einstellungen von Autofahrern zeigte sich, dass die Mehrheit das derzeitige Tempolimit von 130 km/h auf österreichischen Autobahnen bevorzugt (57%), Frauen mehr als Männer. Der Fußgängervorrang am Zebrastreifen wird von 86% positiv bewertet. Automatikgetriebe wird nur von 20% gegenüber Schaltgetriebe bevorzugt. Über Drängler ärgern sich Frauen mehr als Männer. Bei Langsameren ist es umgekehrt, hier ärgern sich Männer mehr als Frauen. Die beliebtesten Autofarben sind schwarz und silber bzw. grau. Es finden sich nur Hinweise darauf, dass Fahrer von schwarzen und hellroten Autos überproportional Unfälle verursachen. Ansonsten finden sich keine signifikanten Zusammenhänge zwischen oben erwähnten Einstellungen und der Unfallhäufigkeit.

Die Unfallhäufigkeit steigt aber mit der Kilometerleistung. Frauen haben auf ihre geringere durchschnittliche Kilometerleistung bezogen mehr Unfälle als Männer, letztere haben aber signifikant schwerere Unfälle.

Bezüglich des Images von Automarken zeigte sich, dass Alfa Romeo deutlich mit Leidenschaftlichkeit und anders sein, BMW mit Stärke, Jaguar mit Reichtum,

Mercedes mit Ruhe und Gelassenheit, Audi mit eigentlich auch schon zum Establishment gehören und VW mit sozial assoziiert werden.

### 3. Introduction and purpose of study

Accident statistics in Austria and internationally generally present only those accidents involving personal injury. These are then linked to the specific circumstances of the accidents and, on this basis, the appropriate road safety measures are developed.

However, the much larger number of accidents are those involving material damage. These accidents are not systematically processed and analysed in Austria. As a result, there is an enormous source of information for road safety work which is simply not exploited.

A further deficiency with the current system is that only the circumstances surrounding the accident (alcohol, speeding, distance-keeping....) are taken into account, rather than the underlying causes of the accident (for example, why the driver was speeding or driving too closely to the vehicle in front).

To really make a positive contribution to road safety measures, it would be useful to research the underlying causes of accidents involving both personal injury and the much larger number of accidents leading to material damage.

Only 1-3% of accidents involving personal injury (and probably the same proportion of accidents involving material damage) can be explained by technical defects, so the vast majority of accidents are caused by human failure. So road safety could be optimised to a considerable degree by analysing human behaviour and experience just prior to the accidents occurring.

Human behaviour – and thus also human traffic behaviour – is always dependent on:

1. Skills (knowledge and ability)
2. Motivation (expectations regarding the consequences and efficiency of a particular action)

This means that driving a car is not just about knowledge and ability; the concrete actions of the individual depend on other factors, particularly changes in motivation or in the person's subjective expectations in terms of the consequences and efficiency of the action (Bandura, 1986).

Motivation, which leads to the action, can be divided into two (mostly sub-conscious) expectations:

#### **1. Expectations regarding the consequences of an action:**

The subjective probability that a specific action has a specific consequence.

Examples:

- Because I am in a hurry, I will drive quicker and thus expect to reach my destination more quickly.
- If I accelerate in the presence of my friends, I expect my position in the peer group to rise.
- If I talk to my girlfriend on my mobile phone, I expect to have a more enjoyable drive.

## 2. Expectations in terms of efficiency:

The subjective probability that one can carry out the action which is necessary to bring about the expected consequence – so the correct self-assessment (!).

Examples:

- I am such a good driver that I have everything under control, even when I am driving quicker when in a hurry.
- I am so good that I can easily drive quicker with my friends.
- I can easily drive and talk on my portable phone at the same time.

## 4. Objectives

Traffic accidents cause human grief and enormous economic loss. The objective of this current study is to contribute towards the reduction of such accidents. The main focus of the study is the human behaviour and experience just prior to the accident.

The real causes of the accidents will become clear as a result of this in-depth analysis. A correlation will also be made between the kilometers driven and accidents, and finally the accident risk of Austrian car drivers will be calculated based on age group and kilometers driven.

Further objectives include analyses of:

- What Austrian car drivers think the main causes of accidents are
- The relationship between personal attitudes and accidents
- The relationship between actual car colour, preferred car colour and accidents
- Accident distribution amongst novice drivers according to months and kilometers driven
- The opinions of car drivers about speed limits, priority at pedestrian crossings and automatic gear shifts.

**Main application:** This accident cause research is designed to be used a basis for national road safety measures (legislative, public sector work, traffic planning, content of training curricula, traffic education in schools...). In particular, the content of the new multi-phase training in Austria can be adapted to take account of these results and to reduce accidents in the most efficient way. The results can also be integrated into the content of initial and ongoing training for driving instructors, trainers, traffic psychologists, technical traffic experts, and vehicle specialists. The methods used in this study (interview forms) have been evaluated and improved at the same time, so they can be used by other professional road safety groups, in particular accident research bodies, as an evaluated method of measurement for accident research.

## 5. Method

Between November 2005 and February 2006, 2128 Austrian car drivers were asked in standardised in-depth interviews what the underlying causes – not just the superficial circumstances – of accidents are. The interviewers were psychologists who were specially trained and who used an interview form which can be found in the annex.

The reason for selecting psychologists to carry out these interviews was that a relaxed atmosphere had to be established as quickly as possible. It was necessary to go into a level of detail concerning accidents which otherwise would have remained suppressed or overlooked. Psychologists are trained to go into depth.

The team of psychologists covered the whole of Austria, in an effort to ensure the most representative sample possible.

The interviewees were asked randomly at industrial fairs, in department stores, in seminars and to a lesser extent in the street. Those who were not interviewed based on random selection (driving instructors, drivers in rehabilitation courses, those taking part in traffic-psychology studies and traffic psychologists themselves) were recorded separately on the questionnaire.

In addition to this sample of car drivers, 1000 telephone interviews were randomly conducted at the end of April 2006 to determine representative figures for the average annual mileage of car drivers according to age and sex. This data set also includes persons according to age who do not drive at all. These average mileage figures per age group were combined with statistics on the population distribution of Austrians according to age group and data from Statistics Austria on injured and killed car drivers according to age. In this way, accident risk was calculated. The results are presented in chapter 7.10.

On average, the interviews with car drivers lasted about 15 minutes. In the first stage, the following questions were asked:

- What do you think the main cause of accidents is?
- Are emotions a primary cause of accidents?
- How frequently do drivers drink and drive?
- What colour is your car?
- What colour would you like your car to be?
- What is your annual mileage?
- When did you first obtain your licence?
- Date of birth
- Preference for automatic or manual gear box
- Preferred speed limit on the motorway
- Your opinion on whether or not pedestrians should have priority at zebra crossings
- Experience of stress in traffic: general, due to other car drivers pressurising you, slow drivers
- The image of the following car brands: Alfa Romeo, Audi, BMW, Jaguar, Mercedes and Volkswagen. These brands were selected because they are



affordable and popular 'dream cars'; and Volkswagen because it is by far the most sold car brand on the market.

If the interviewees have had one or more accidents in the last 5 years, the accidents were analysed in the following manner. The previous 5 to 10 minutes of the interview created an atmosphere of openness and readiness to answer the following questions:

- The exact circumstances surrounding the accident (date, time, weekday, road surface condition, gravity of accident, type of accident)
- Primary accident causes
- Was it largely a result of your emotional state?
- Was anyone under the influence of alcohol or drugs?
- Colour of the car which was in the accident
- Annual mileage in the 12 months prior to the accident

As already mentioned above, the standardised interview form can be found in the annex.

Initially, the interviewer asked the questions without supporting answers. If the interviewee had to be supported, all the possible responses were read out in advance. While exploring all the causes of the accident, the interviewee was asked for as long as it took to reveal all the relevant factors which were considered to be primary causes. Special attention was given to ensure that internal rather than external causes were worked on, as long as this reflected the real situation and external allocation of blame only appeared as a product of suppression.

## 6. Description of the samples

A total of 2128 Austrian drivers were interviewed. 726 persons reported a total of 852 accidents. The sex distribution was in balance:

Sex	Total: n=2128	Accidents: n=726 persons who reported 852 accidents
Female	47,24%	46,27%
Male	52,76%	53,73%

In terms of accidents with personal injury, the difference between men and women was clearer. According to data from 2005 from Statistik Austria, there were 50627 drivers implicated in accidents with personal injury (whether they were injured or not), of which 35,7% were women and 64,3% were men.

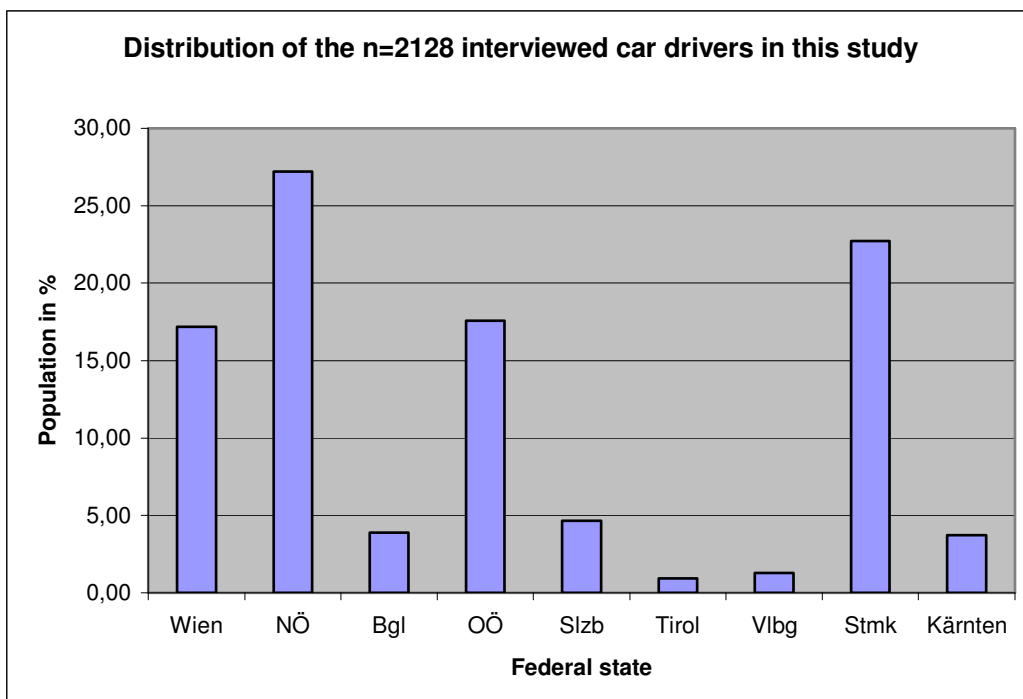
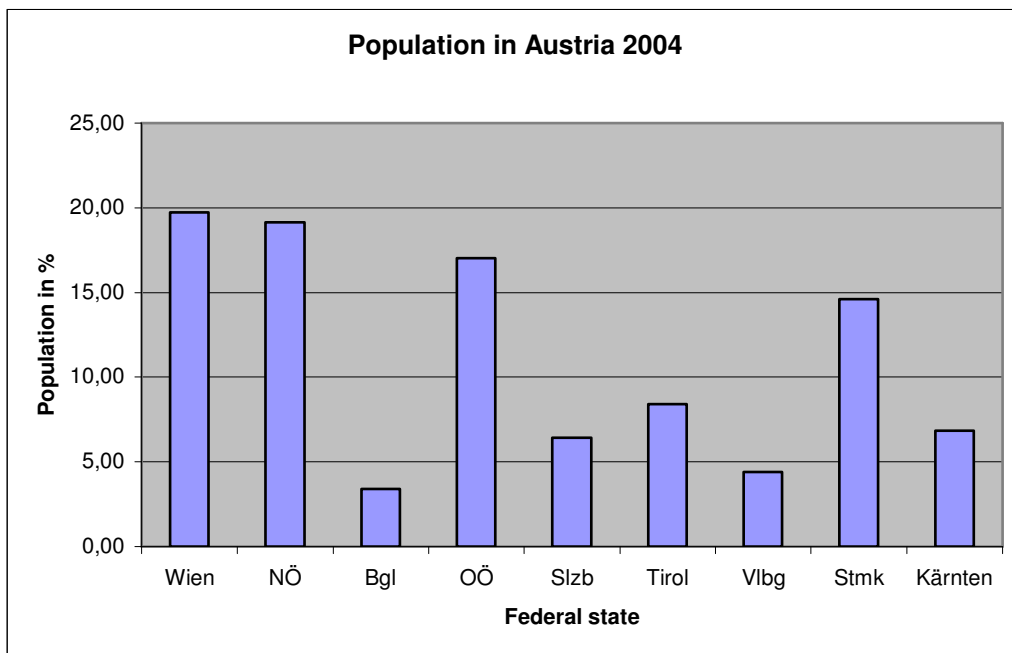
A deeper analysis of the data relating to the accidents in this study revealed the following distribution:

	Female		Male	
	Absolute	Percent	Absolute	Percent
No accident	653	65,3%	714	63,9%
Accident (>=1)	347	34,7%	403	36,1%
Sum	1000	100%	1117	100%

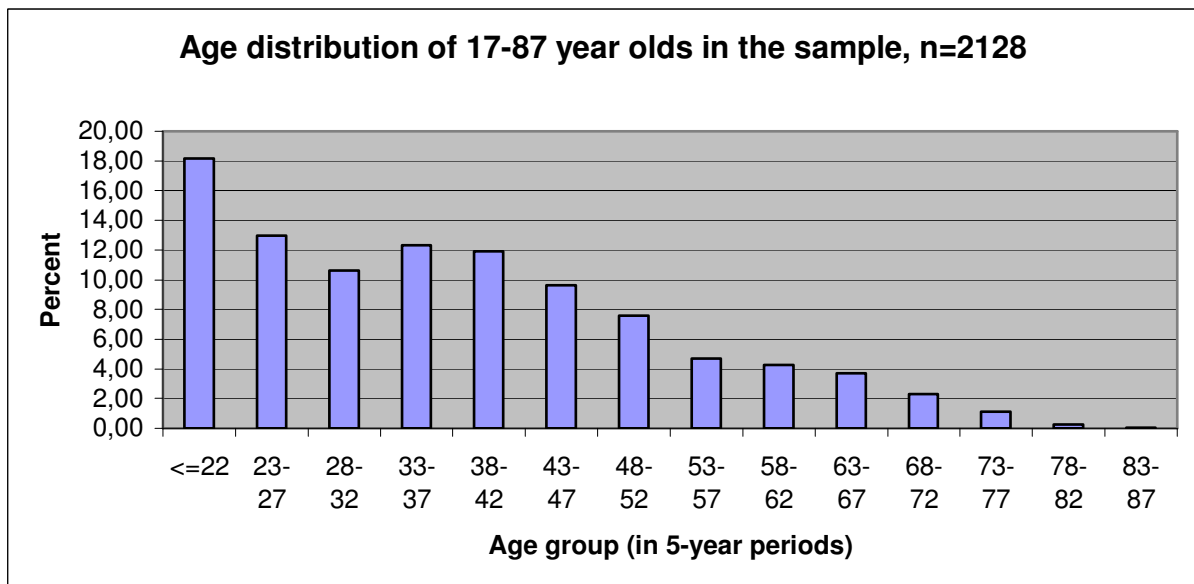
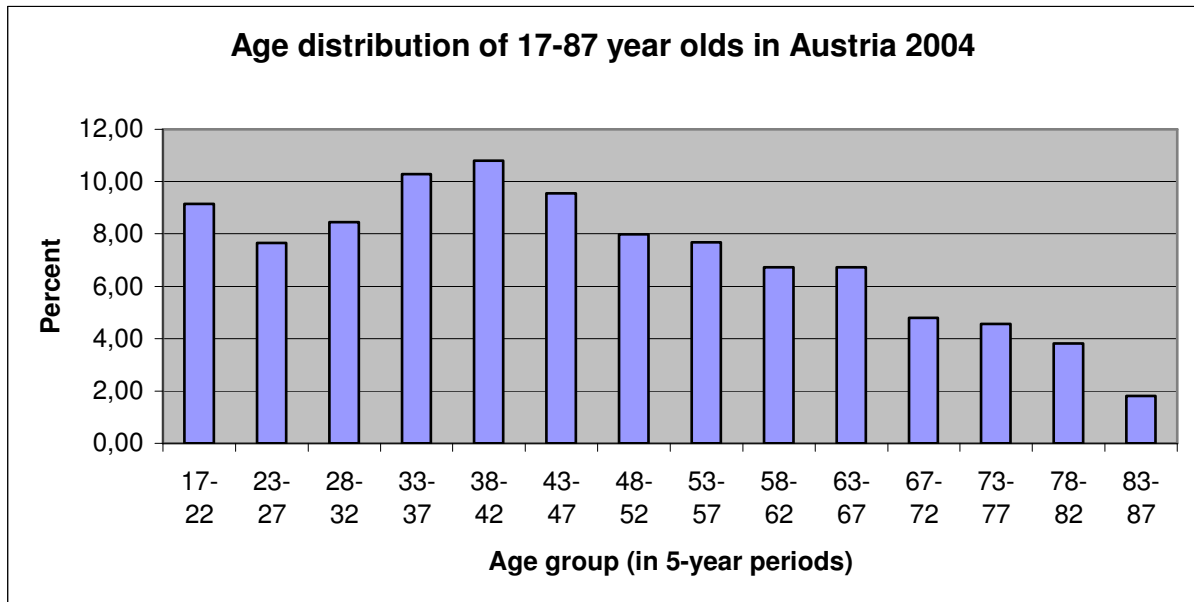
34,7% of the women and 36,1% of the men from the total sample reported accidents. Thus, it would seem from this sample that the chances of a man being involved in an accident are about the same as for a woman.

There was an attempt to make the sample as representative as possible according to the distribution of the population across the Austrian federal states and according to the age of the car driving population.

The distribution of the population according to federal state can be seen in the two following graphs:



With respect to age, the representativeness of the car driving population could also be modelled. Older drivers drive considerably less, consequently they are less represented in the sample than in the general population distribution; see diagrams below:



80% of the interviewees were asked randomly if they were willing to take part in the interview (at events, in the street, etc.). The remaining 20%, which were not selected randomly, were composed of participants of the Austrian multi-phase training, in traffic offenders' courses, undergoing traffic-psychological assessment, as well as driving instructors, trainers and even psychologists themselves. The exact percentile distribution can be seen below. A Chi-Square test showed, however, that there was no significant difference in accident involvement between the subgroups ( $p=,6$ ). For

this reason, no further analysis was carried out according to selection criteria, because the subgroups could be considered homogeneous.

<b>Selection criterion</b>	<b>Valid percentage</b>
Traffic psychological assessment	1,04
Multi-phase training	10,08
Traffic offender course participants	4,07
Driving instructor / trainer	4,07
Traffic psychologist	0,99
Other	79,75
Total	100
N	2128

## 7. Results

This section presents the results of the study. Chi-Square tests and T-tests were carried out.

### 7.1. Traffic accidents

The main results of this study are based on the analysis of 852 road accidents. Afterwards, the survey data is presented.

#### 7.1.1. Accidents and kilometers driven

Persons who had not caused any accidents drove, in the year preceding the interview, an average of 13602 km (n=1364). Persons who had caused one or more accidents drove, in the year preceding the interview, an average of 14907 km (n=852 accidents caused by 726 persons). Each of the 726 persons who caused accidents in the year preceding the interview drove an average of 16087 km. A comparison of the mean with regard to the kilometers driven by persons not causing an accident (13602 km) and those who caused one or more accidents (16087 km) is significant (T-Test for independent samples,  $p=,000$ ). In summary, it can be concluded that accident risk increases as the number of kilometers driven increases.

Based on the total sample, women drove an average of 11065 km per year, whereas men drove 17644 km. This difference is significant (T-Test,  $p=,000$ ).

As already mentioned in the chapter describing the samples, 34,7% of the women and 36,1% of the men reported accidents. So, at least in terms of this sample, the accident probability for men and women is about the same.

Based on the different amount of kilometers driven, women actually had a higher accident risk: in terms of the kilometers driven by persons reporting accidents, women drove an average of 11078 km in the year preceding the accident, and men drove 18031 km. However, the men caused the more serious accidents, as discussed in the following chapter.

Comparable results have been reported by Williams, 1995 for the USA (in Maycock, 2002), whereby women have slightly more accidents than men when taking into

account kilometers driven, and men are more frequently involved in fatal accidents (again, based on kilometers driven).

### 7.1.2. Gravity of the accidents

The greatest proportion of the accidents were those involving light material damage (up to 500 Euro). These accidents accounted for 62,7% of the total of 852 accidents. 33% were accidents involving moderate to serious material damage and 4,3% were accidents involving personal injury.

When compared to men, women are over-represented in the accidents involving light material damage, whereas the opposite was the case for accidents involving moderate to serious material damage and those involving personal injury. In summary, this means that women tend to have light accidents (Chi-Square,  $p=,000$ ), see table below:

Gravity of accident	Accidents in %	Women: Accidents %	Men: Accidents %
Light material damage	62,68	70,61	56,10
Moderate to serious material damage	32,98	27,03	37,90
Personal injury	4,34	2,36	5,99

### 7.1.3. Type of accident

The most frequent type of accident (38,1%) was when parking. These accounted for 56,3% of accidents involving light material damage, but only 8,2% of those involving moderate to serious material damage and 2,7% of those involving personal injury. With single-vehicle accidents, on the other hand, they accounted for the highest proportion of accidents involving moderate to serious damage (27,2%) and personal injury (21,6%); they only accounted for 9,2% of the accidents leading to light material damage. Accidents at junctions and those involving wild animals with swerving more frequently led to moderate to serious material damage. The above results were significant (Chi-square,  $p=,000$ ).

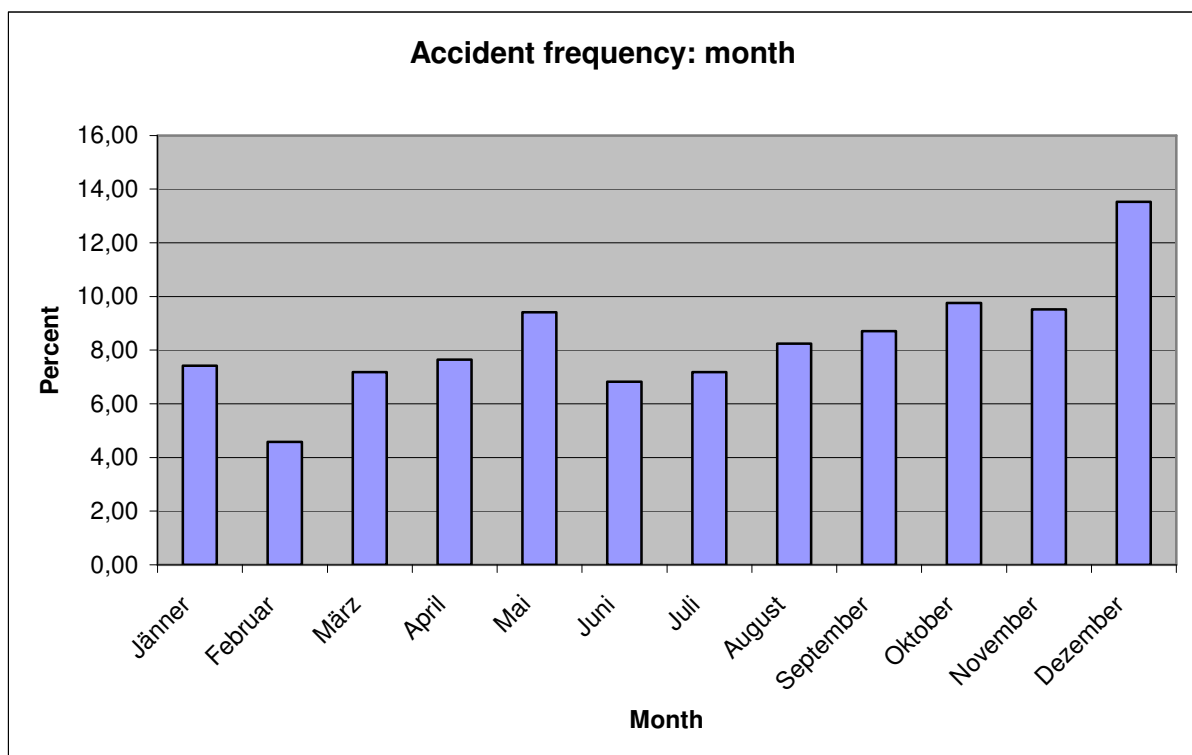
Single-vehicle accidents involve women significantly less than men (Chi-Square,  $p=,017$ ), whereas women had a tendency to have more frequent accidents involving material damage while parking, see the table below:

Type of accident	Accidents in %	Light material damage	Moderate to serious material damage	Personal injury	Women: Accidents in %	Men : Accidents in %
Front-rear collision in same line of traffic	20,75	20,26	22,22	13,51	21,78	19,87
Lateral collision in same line of traffic	5,16	3,75	7,17	10,81	4,46	5,56
Oncoming traffic	3,52	2,44	3,94	16,22	2,62	4,06
Accident at junction	10,32	4,88	20,43	13,51	10,76	10,04
Single vehicle	15,59	9,19	27,24	21,62	11,55	19,02
Wild animals with swerving	2,11	0,56	5,02	2,70	1,57	2,56
Wild animals without swerving	2,58	1,88	3,94		1,57	3,42
Pedestrian	1,29	0,19	1,08	18,92	1,05	1,50

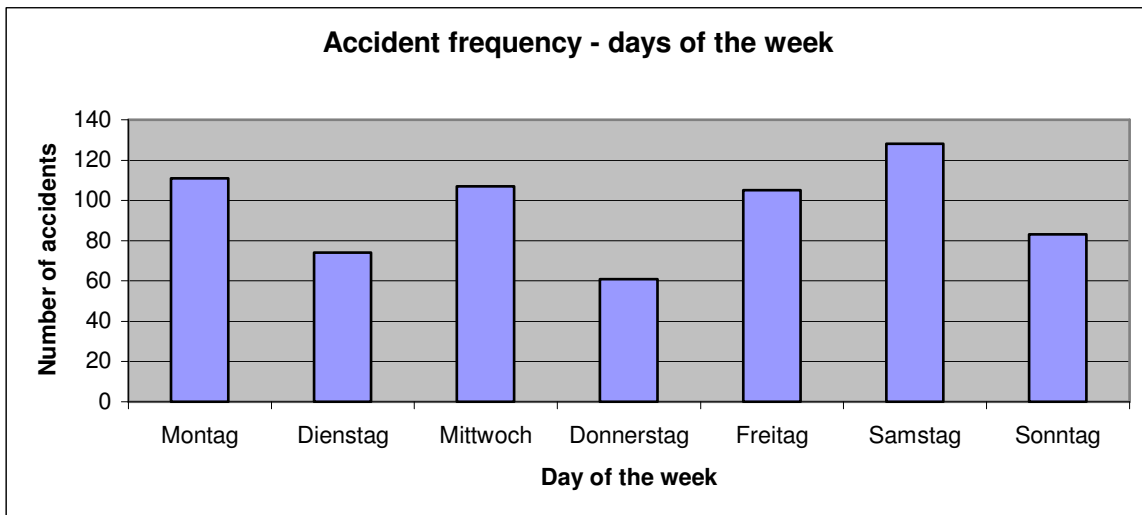
Parking / reversing	38,10	56,29	8,24	2,70	44,09	33,33
Other	0,59	0,56	0,72		0,52	0,64
					n = 381	n = 468

### 7.1.4. Accident distribution according to month, day and time of day

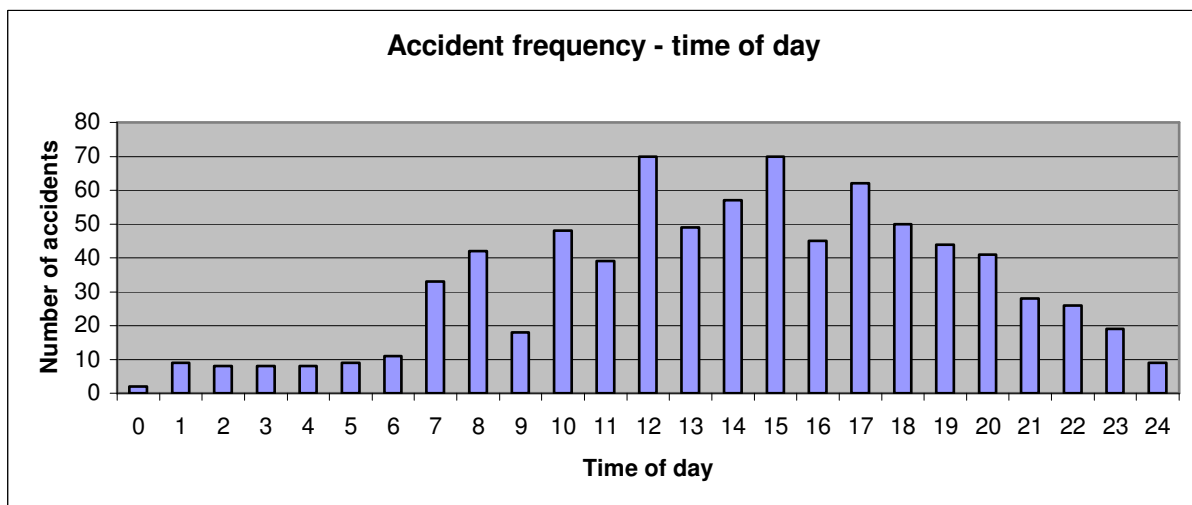
Most of the car accidents occurred in December, with the least occurring in February. This might be explained by the fact that drivers fail to take into account the slippery road conditions (first snowfall) in December. On the other hand, by February and at the end of the winter, one has got used to these conditions. Another possible explanation could be the increasing rush towards Christmas. Details are presented in the following graph:



Most accidents occurred on Saturdays, followed by Mondays. The least accidents happened on Thursdays, as shown in the following diagram. A possible explanation for this tendency is that people are thinking in free-time mode at the beginning of the weekend, which is perhaps not the most sensible mode for driving. As for Mondays, this could be put down to typical "Monday-stress". Both free-time thoughts and stress on Mondays lead to higher inattentiveness while driving.



What is striking is that the accidents do not tend to coincide with the densest traffic periods. Accidents tend rather to occur around midday and in the afternoon. A possible interpretation is that people tend to suffer from loss of concentration around midday and in the afternoon. This conforms to the main results presented in the chapter on “Accident Causes” whereby the majority of accidents can be put down to lack of attention. The following diagram presents accident distribution according to the time of day:



The more serious accidents occurred in the nighttime hours between 8pm and 3am. This result is significant (Chi-Square test  $p=,000$ ).

## 7.1.5. Accident causes

The following section presents the results in percentage terms of the primary accident causes according to frequency, when considering all the accidents analysed in this study.

### 1. Inattentiveness/distraction

In determining primary accident causes, inattentiveness or distraction was found to be responsible for 35,6% of the 853 accidents investigated. When divided according to accident gravity, inattentiveness was responsible for 39,3% of accidents involving light material damage, for 25,5% of accidents involving moderate to heavy material damage and for 20,6% of accidents involving personal injury. These differences are significant (Chi-Square,  $p=,000$ ).

When looking at the exact nature of the inattentiveness which caused these 35,6% of accidents, the first reason, with 17,1%, was being 'lost in thought', followed by 'intensive discussions' in the car with 4,6%, distraction due to mobile phones with 4,3%, busy doing something (radio, smoking, eating...) with 3,9%, distracted by something interesting in the street with 2,8%, distraction due to a child-passenger at 1,4% and 'other' distractions at 1,6%.

Also when taking into account accident gravity, being 'lost in thought' was the primary factor. It is striking that none of the accidents involving personal injury could be explained by the use of a mobile phone. Perhaps this can be explained by the relatively small sample, whereby the generalisation of the evidence becomes correspondingly smaller.

### 2. Speed

In second place as an accident cause, and far behind distraction, 14,4% of accidents were explained by inappropriate speed. It is plausible that only 10% of accidents involving light material damage could be put down to speed, whereas it was 23,6% for accidents involving moderate to heavy material damage. 8,8% of accidents involving personal injury could be explained here by inappropriate speed. These differences are significant (Chi-Square,  $p=,000$ ).

The reasons for excessive speed were explained primarily by stress or being in a hurry (6,5%), followed by thoughtlessness (4,2%). Other factors such as excessive speed due to aggression or annoyance, enjoying speed or testing ones skills led to 1% of the accidents. Frustration, showing off and other factors were named in less than 1% of cases as the main cause of the accident.

When taking into account the gravity of the accident, stress and being in a hurry remained the primary explanations for inappropriate speed. Though 2,9% of accidents involving personal injury due to excessive speed came about as a result of frustration.

### 3. Lack of experience

In 14,1% of cases an incorrect assessment of the situation as a result of a lack of experience with such specific situations was thought to be the primary cause of the accident (particularly due to overlooking or wrongly anticipating something). In these cases the drivers had basic skills but they had not yet experienced such a situation



and consequently could not rely on prior experience. Lack of experience led to 11,8% of accidents involving moderate to severe material damage or personal injury and to 14,1% of accidents involving minor material damage. As one would expect, this accident cause was found considerably more frequently amongst young drivers.

#### **4. Safety margins**

Lack of proper safety margins in relation to the vehicle in front was found to be the main cause of the accident in 9,6% of cases. In accidents with minor material damage this percentage was 11,1, with moderate to serious damage it was 7,8 and in the case of accidents with personal injury it accounted for 2,9% of cases.

The main reason for the lack of proper safety margins was found to be thoughtlessness (4,9% of all accidents), followed by stress or being in a hurry (4,1% of all accidents). Other emotions apart from stress such as aggression, frustration, showing off, feeling powerful, having fun, etc, only accounted for about 0,6% of all accidents.

#### **5. Unexpected events**

Sudden unexpected external events were considered to the main cause of the accident in 9,3% of cases. These essentially external factors such as wild animals, sudden blinding due to lights, etc was responsible for 7,5% of accidents involving light material damage, 12,2% of accidents with moderate to serious material damage and for 14,7% of accidents involving personal injury.

#### **6. Lack of skills**

6,6% of accidents could be accounted for by a lack of knowledge or skills (e.g. an incorrect reaction or over-reaction due to an excessively demanding situation because everything happened too quickly or too many things happened at once). This percentage stayed the same for all categories of accidents involving material damage, but it accounted for no accidents resulting in personal injury.

#### **7. Fatigue**

4,9% of the accidents could be explained primarily by fatigue. Accidents due to fatigue were underrepresented in those causing light material damage (3,3%), it accounted for 7,8% of accidents with moderate to serious damage and for 5,9% of accidents involving personal injury.

#### **8. Other factors and Alcohol**

3,6% of accidents could be explained by alcohol consumption, and only 1,8% due to 'other factors'. But 6,1% of the drivers involved in the accidents admitted they were driving under the influence of alcohol, even if they didn't consider this factor to be the primary cause of the accident. So the accident would, in their opinion, have taken place in the same way even if they had been sober. These results correspond to official statistics on personal injury provided by Statistik Austria, according to which 6,7% of all accidents involved alcohol.

The high correlation between the results of this study and official statistics can be explained by the high level of openness generated in the interviews. It can be assumed that the previously high rate of unreported cases has been reduced by the Ministry of Transport's decree to carry out an alcohol test on all drivers involved in accidents with personal injury.

This openness in the interviews probably means that the small percentage of drug-related accidents corresponds more or less to reality too: only 0,6% of drivers admitted they were under the influence of drugs during the accident.

### **10. Opinions on causes of accidents**

All 2128 persons interviewed were also asked what they thought the main causes of accidents were. The results of these opinions expressed by Austrian car drivers are presented in percentages in the table below. The opinions correlate significantly with the actual causes of accidents (Chi-Square,  $p=,000$ ).

Considerable differences were only found in the case of alcohol and drug-related accidents. The interviewees considered drink-driving to be the main factor in 28,6% of all accidents and that drug consumption accounted for about 10,7%. As mentioned above, only about 6% of accidents involved alcohol and less than 1% involved drugs. It should be mentioned again, however, that there were differences in the survey between alcohol consumption being the primary cause of the accident, and drivers being under the influence of alcohol.

The most obvious reason for this discrepancy between the high estimates regarding alcohol and drugs and the smaller actual values is that the media and one-sided road safety campaigns create a strongly exaggerated image of the problem. There exists a danger that too much emphasis is placed on peripheral groups of drink and drugged drivers and that valuable resources are no longer available for information campaigns on the more prominent causes of accidents. These drink and drugged drivers could even constitute scapegoats, which distract attention from the fact that the most frequent causes of accidents involve normal drivers (inattentiveness, stress....).

### **11. Sex distribution according to cause of accident**

As the cause of 22,6% of all accidents, women are significantly more likely to be lost in thought than men (12,8%). distraction by child-passengers also involves significantly more women than men (2,7%). But alcohol-related cases were found to occur significantly more frequently with men (5,9%) than with women (0,8%). (Chi-Square,  $p=,000$ ).

Getting rid of frustration, joy from taking risks, fun and alcohol consumption are rare causes of accidents. But when they do lead to accidents, they are significantly more likely to be serious accidents (Chi-Square,  $p=,000$ ).

The detailed results are shown in the table below. The causes of accidents have been categorised into sub-groups; the main categories of accident causes are noted in brackets next to each sub-group (lack of safety margins, speed and inattentiveness):

<b>Cause of accident</b>	<b>Cause of accident (opinion) %</b>	<b>Actual cause of accident %</b>	<b>Light material damage %</b>	<b>Moderate to serious damage %</b>	<b>Personal injury %</b>	<b>Women: accidents in %</b>	<b>Men: accidents in %</b>
Stress, being in a hurry (lack of safety margins)	4,23	4,09	4,79	3,32		3,81	4,13
Thoughtlessness (lack of safety margins)	3,81	4,93	5,56	4,06	2,94	4,63	5,22
Annoyance, aggressive, frustration (lack of safety margins)	0,78	0,24	0,38			0,27	0,43
Fun, joy of risk, sensation seeking (lack of safety margins)	0,47	0,12	0,19				
Experiencing power, showing-off (lack of safety margins)	0,57	0,12	0,19				0,22
Other reason (lack of safety margins)	0,21	0,12		0,37		0,27	
Stress, being in a hurry (Speed)	13,78	6,50	4,41	10,33	5,88	5,18	7,61
Thoughtlessness (Speed)	7,10	4,21	3,45	6,27		3,81	4,35
Annoyance, aggression (Speed)	1,25	1,08	0,77	1,85		0,54	1,52
Getting rid of frustration (Speed)	0,68	0,24	0,19		2,94		0,43
Fun, joy of risk, sensation seeking (Speed)	7,46	1,20	0,57	2,58		0,82	1,52
Experiencing power, showing-off (Speed)	3,18	0,12		0,37			0,22
Testing skills, testing out the car (Speed)	0,94	0,84	0,38	1,85		0,27	1,30
Other reason (Speed)	1,20	0,24	0,19	0,37		0,27	0,22
My thoughts (Inattentiveness, distraction)	15,19	17,09	20,31	12,18	8,82	22,62	12,83
Mobile phone (Inattentiveness, distraction)	6,68	4,33	5,75	1,48		3,54	5,00
Conversation in car (Inattentiveness, distraction)	1,41	4,57	5,75	2,58	2,94	3,81	5,22
Other activity (Inattentiveness, distraction)	7,15	3,85	3,83	4,06	2,94	4,36	3,48
Child-passenger (Inattentiveness, distraction)	0,42	1,44	1,34	1,48	2,94	2,72	0,43
Something interesting in the street (Inattentiveness, distraction)	0,63	2,77	2,30	3,69	2,94	1,91	3,26
Other (Inattentiveness, distraction)	0,47	1,56	2,11	0,74		2,45	0,87
Fatigue	3,29	4,93	3,26	7,75	5,88	3,54	5,87
Excessively demanding situation	4,96	6,62	7,09	6,64		8,99	4,78
Incorrect assessment of situation due to lack of experience with such situations	5,17	14,08	15,52	11,81	11,76	16,89	11,96
Sudden unexpected external events	0,78	9,27	7,47	12,18	14,71	7,36	10,87
Alcohol-related	7,78	3,61	2,30	2,95	29,41	0,82	5,87
Drug-related	0,10	0,00					
Other	0,31	1,81	1,92	1,11	5,88	1,09	2,39
	n= 2128	n= 827	n= 522	n=271	n=34	n = 367	n = 460

## 12. Emotions as a cause of accidents

42% of all accidents were primarily caused by some sort of mental state wherein there was an emotional imbalance, such as stress, worries, sadness, irritation, etc.

## 7.1.6. Accident causes according to accident type

The following tables present separately the causes of accidents for each different type of accident. Some correlations are particularly worth of note:

The majority of front-rear accidents in the same line of traffic were due to lack of proper safety margins to the car in front, and to distraction. The underlying causes of insufficient safety margins were significantly more frequently 'thoughtlessness' and 'stress'. distraction was significantly more frequently a result of something interesting in the street ( $p=,000$ ):

<b>Front-rear collisions in the same line of traffic (n=173):</b>	
<b>Cause of accident</b>	<b>Cause in %</b>
Stress, hurry (lack of safety margins)	15,03
Thoughtlessness (lack of safety margins)	17,92
Irritation, aggression, frustration (lack of safety margins)	0,58
Fun, joy of risk, sensation-seeking (lack of safety margins)	0,58
Stress, hurry (Speed)	5,78
Thoughtlessness(Speed)	2,31
Fun, joy of risk, sensation seeking (Speed)	0,58
My thoughts (Inattentiveness, distraction)	12,14
Portable phone (Inattentiveness, distraction)	2,89
Conversation in car (Inattentiveness, distraction)	5,20
Other activity (Inattentiveness, distraction)	5,20
Child-passenger (Inattentiveness, distraction)	2,89
Something interesting in the street (Inattentiveness, distraction)	6,94
Other	0,58
Fatigue	1,73
Excessively demanding situation	6,36
Wrong assessment of situation due to lack of experience with situation	6,36
Sudden, unexpected external occurrences	6,36
Alcohol-related	0,58

Lateral collisions were most often caused by inattentiveness as a result of inner thoughts:

<b>Lateral collisions in same line of traffic (n=41):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry(lack of safety margins)	2,44
Thoughtlessness (lack of safety margins)	2,44
Irritation, aggression, frustration (lack of safety margins)	2,44
Experiencing power, showing-off(lack of safety margins)	2,44
Thoughtlessness (Speed)	2,44
Irritation, aggression (Speed)	2,44
My thoughts (Inattentiveness, distraction)	19,51
Mobile phone (Inattentiveness, distraction)	2,44
Conversation in car(Inattentiveness, distraction)	9,76
Other activity(Inattentiveness, distraction)	4,88
Child passenger(Inattentiveness, distraction)	2,44
Something interesting in the street(Inattentiveness, distraction)	2,44

Other	4,88
Fatigue	4,88
excessively demanding situation	7,32
Wrong assessment of situation due to lack of experience with situation	7,32
Sudden, unexpected external occurrences	9,76
Alcohol-related	7,32
Other	2,44

Accidents involving oncoming traffic (also including overtaking accidents) showed a wide range of different causes:

<b>In oncoming traffic (n=28):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry (Speed)	7,14
Thoughtlessness (Speed)	7,14
Irritation, aggression (Speed)	3,57
My thoughts (Inattentiveness, distraction)	7,14
Conversation in car (Inattentiveness, distraction)	3,57
Other activity (Inattentiveness, distraction)	3,57
Something interesting in the street (Inattentiveness, distraction)	3,57
Fatigue	14,29
excessively demanding situation	17,86
Wrong assessment of situation due to lack of experience with situation	10,71
Sudden unexpected external occurrences	10,71
Alcohol-related	7,14
Other	3,57

Accidents at junctions were primarily caused by inattentiveness due to inner thoughts, followed by stress which led to excessive speed. In comparison to other accident types, excessive speed due to stress was significantly more common than other causes ( $p=,000$ ). Lack of experience and excessively demanding situations were also well represented amongst the accidents:

<b>Accidents at junctions (n=85):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry (lack of safety margins)	1,18
Thoughtlessness (lack of safety margins)	5,88
Other reason (lack of safety margins)	1,18
Stress, hurry (Speed)	12,94
Thoughtlessness (Speed)	3,53
Fun, joy of risk, sensation seeking (Speed)	1,18
Testing skills, testing car (Speed)	2,35
My thoughts (Inattentiveness, distraction)	21,18
mobile phone (Inattentiveness, distraction)	3,53
Other activity (Inattentiveness, distraction)	5,88
Child passenger (Inattentiveness, distraction)	1,18
Something interesting in the street (Inattentiveness, distraction)	3,53
Other	1,18

Fatigue	7,06
excessively demanding situation	9,41
Wrong assessment of situation due to lack of experience with situation	10,59
Sudden unexpected external occurrences	2,35
Alcohol-related	3,53
Other	2,35

Single-vehicle accidents were largely due to excessive speed. The underlying causes for such excessive speed were (significantly) thoughtlessness, irritation, aggression, fun and risk-taking for pleasure, experiencing power and showing off and testing one's skills. Inattentiveness alone, without excessive speed, led significantly less frequently to single-vehicle accidents ( $p=,000$ ).

What is striking is the 5,2% of single-vehicle accidents whose primary cause was risk-taking for fun. This factor comes in well under 5% in the case of all other accident types:

<b>Single-vehicle accident(n=133):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry (Speed)	9,77
Thoughtlessness (Speed)	14,29
Irritation, aggression (Speed)	3,01
Fun, joy of risk, sensation seeking (Speed)	5,26
Experiencing power, showing-off (Speed)	0,75
Testing own skills, testing car (Speed)	3,76
Other reason	0,75
My thoughts (Inattentiveness, distraction)	4,51
Conversation in car (Inattentiveness, distraction)	2,26
Other activity (Inattentiveness, distraction)	3,76
Child passenger (Inattentiveness, distraction)	0,75
Fatigue	5,26
excessively demanding situation	2,26
Wrong assessment of situation due to lack of experience with situation	15,04
Sudden unexpected external occurrences	15,79
Alcohol-related	11,28
Other	1,50

Accidents involving material damage due to wild animals were explained primarily but not exclusively by the appearance. A further observation is that the consequences of an accident with swerving were significantly worse than those without swerving:

<b>Wild animals with swerving (n=14):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry (Speed)	14,29
Thoughtlessness (Speed)	7,14
Getting rid of frustration (Speed)	7,14
Fun, joy of risk, sensation seeking (Speed)	7,14

My thoughts (Inattentiveness, distraction)	7,14
excessively demanding situation	7,14
Wrong assessment of situation due to lack of experience with situation	7,14
Sudden unexpected external occurrences	42,86
<b>Wild animals without swerving (n=20):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry (Speed)	15,00
Thoughtlessness (Speed)	10,00
Irritation, aggression (Speed)	5,00
mobile phone (Inattentiveness, distraction)	5,00
Sudden unexpected external occurrences	65,00

The numerous accidents while parking were primarily due to inattentiveness, but also due to lack of experience ( $p=,000$ ):

<b>Parking or reversing (n=323):</b>	
<b>Accident cause</b>	<b>Cause in %</b>
Stress, hurry (lack of safety margins)	1,86
Thoughtlessness (lack of safety margins)	1,24
Stress, hurry (Speed)	3,72
Thoughtlessness (Speed)	0,93
Irritation, aggression (Speed)	0,62
Getting rid of frustration (Speed)	0,31
Other reason	0,31
My thoughts (Inattentiveness, distraction)	26,32
mobile phone (Inattentiveness, distraction)	8,05
Conversation in car (Inattentiveness, distraction)	6,50
Other activity (Inattentiveness, distraction)	3,10
Child passenger (Inattentiveness, distraction)	1,24
Something interesting in the street (Inattentiveness, distraction)	1,55
Other	2,79
Fatigue	4,95
excessively demanding situation	7,43
Wrong assessment of situation due to lack of experience with situation	21,05
Sudden unexpected external occurrences	4,02
Alcohol-related	1,24
Other	2,79

## 7.1.7. Concluding recommendations

The results of the accident causes analysed now offer us the practical possibility to minimise accident risk in a targeted manner. Only about 9% of accidents can be put down to 'residual risk' – namely sudden and unexpected external events. The following table contains recommendations which can reduce the accident risk of car drivers by a specific percentage. These percentages are simply the reverse of the percentages of accidents caused by the specific factor. So, accident cause no. 1 was, with 36%, inattentiveness. Correspondingly, one can reduce one's risk of an accident by 36% by devoting sufficient attention to the driving task:

<b>100% accident risk can be reduced by 91% (!) by:</b>		<b>100%</b>
<b>1. Attentiveness</b>		<b>- 36%</b>
• Thinking about driving the car rather than about other things	-17,0%	
• Keep talking with passengers to a minimum; priority to driving	-4,6%	
• Only use mobile phone before and after the drive	-4,3%	
• Only use hands for driving task, not for other activities	-3,9%	
• Only look at the traffic, not anything else which is interesting	-2,8%	
• Concentrate on traffic despite child passenger	-1,4%	
• Other distractions	<u>-1,6%</u>	
	<b>-35,6%</b>	
<b>2. Correct speed according to the situation</b>		<b>-14 %</b>
• Appropriate speed despite stress / being in a hurry	-6,5%	
• Keep a conscious eye on speed	-4,2%	
• Do not speed due to frustration, irritation, showing, off, having fun, etc	<u>-3,3%</u>	
	<b>-14,0%</b>	
<b>3. Make the correct assessment of the situation and self-assessment of your own driving ability</b>		<b>- 14%</b>
<b>4. Adequate safety margins</b>		<b>- 10%</b>
• Consciously keep proper safety margins instead of driving thoughtlessly	-4,9%	
	-4,1%	
• Keep correct safety margins despite stress and being in a hurry	<u>-1,0%</u>	
• Do not drive too closely to other vehicles due to anger or experiencing power	-10,0%	
<b>5. Avoid excessively demanding situations by correctly assessing your own abilities</b>		<b>- 7%</b>
<b>6. Drive when you are well rather than tired</b>		<b>- 5%</b>
<b>7. Avoid other risks, such as alcohol, drugs, etc</b>		<b>- 5%</b>
<b>8. 9% residual risk of unexpected external events remain</b>		<b>9%</b>



## 7.1.8. Young driver's risk and novice driver risk

### Young driver's risk

A further important aspect of the results is that persons under 25 years old are significantly more likely to cause an accident due to incorrect assessment of a situation (25,6%). Persons over 30 are significantly less likely to cause accidents for this reason (8,2%). This comparison of two extreme groups is, with 1% error probability according to the Chi-square test, significant. In spite of this, the main cause of an accident for drivers under 24 years old is lack of attentiveness (30,3%). The other accident causes do not differ significantly from one of these two groups to the other.

Single-vehicle accidents were significantly more frequent amongst persons under 24 (Chi-Square,  $p=,000$ ), which corresponds to official personal injury statistics from Statistik Austria.

With respect to persons over 65 years old, there are no significantly different causes of accidents in this sample, or for accident cause according to accident type, when compared to drivers under 65. It should be borne in mind, however, that there were only 36 persons in this age category.

### Novice driver risk:

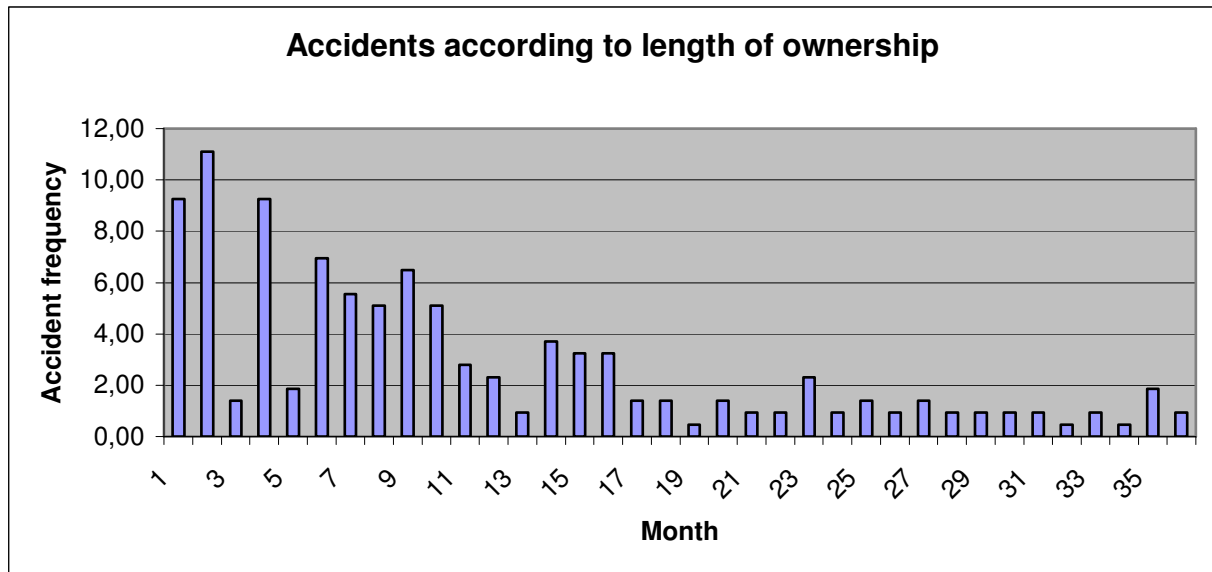
Also when looking at length of licence ownerships, namely unrelated to age, similar patterns to under 24 year olds were revealed: persons who had held their licence for up to 36 months were significantly more likely to cause an accident due to incorrect assessment of the situation (27,5%). Persons who had held their licence for longer than 36 months were significantly less likely to cause an accident due to incorrect assessment of the situation 9,5% (Chi-Square,  $p=,000$ ). As far as other accident causes are concerned, there were no significant differences in relation to length of licence ownership. As for young drivers under 24, inattentiveness was the number one cause of accidents amongst novice drivers (28,9%).

Again, as with youngsters, the single vehicle accident was a significantly more likely accident type for novice drivers (licence for under 36 months), Chi-Square,  $p=,000$ . Of course, it should be borne in mind that the vast majority of novice drivers are also young in this sample. An exact analysis of the question as to whether older novice drivers have less single-vehicle accidents than young novice drivers can only be answered in a study with a larger sample.

## 7.1.9. Accident distribution in the first 3 years

For all car drivers who reported accidents which took place in the first 3 years of licence ownership, it was calculated which month the accident took place in. This analysis was irrespective of age. It is clear to see that accident frequency is highest in the first months of licence ownership and that it continually decreases thereafter. Clearly, the accident risk decreases as driving experience increases.

Most accidents also occurred in the first months of the first year of driving licence ownership with 18 and 19 year old drivers.



n=216 of accidents caused by novice drivers

The continual reduction in accident risk from the beginning on has also been shown in international studies: Sagberg (2002) and Gregersen (2000) found a continual decreasing accident rate in the first 18 months after obtaining the licence. After 8-10 months, the risk dropped by 50%.

From Germany, Willmes-Lenz (2004) and Schade (2001) also reported a continuously decreasing accident risk. Accident risk also halved after about 9 months. After 2,5 years the accident risk had sunk to a residual 10%.

Maycock (1991), too, reported a similar continuously sinking accident risk, this time according to age of novice driver and according to experience, regardless of age. In the first year of licence ownership, the accident risk falls by 30%, in the second year by 17%, in the third by 11%, in the fourth by 7%, etc. In total, the novice driver risk, irrespective of age, falls by 59% in the first 8 years. With respect to age, the accident risk falls from year to year, for drivers between 17 and 25 years old, by 5% annually. The risk decreases with increasing age between 17 and 25 years old by 31%. The total effect of driving experience and age leads, in the opinion of the author, to a reduction in accident risk of 72% within 8 years.

## 7.2. Colour of the car

The most frequently wished for car colour is black (24%), but only 13,6% actually have a black car. These 13,6% are actually responsible for 18% of all accidents. This is the equivalent of an accident quotient of 1,3.

This accident quotient is only exceeded by one other colour: light red (=1,38). Light green cars seem to have the highest quotient, and yellow the lowest, but this two

colours have been excluded due to lack of statistical power. Only 2% of the cars are light green and only 1% are yellow.

The most common colour of a car is silver / grey. Details can be found in the table below:

Colour	Preferred colour		Actual colour		Car in accident		Car in accident/ car colour
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Quotient
Silver, grey	405	19,04	463	21,87	170	19,88	0,91
Black	512	24,07	288	13,60	154	18,01	1,32
White	78	3,67	217	10,25	100	11,70	1,14
Dark red	143	6,72	196	9,26	84	9,82	1,06
Light red	128	6,02	126	5,95	70	8,19	1,38
Dark blue	271	12,74	293	13,84	120	14,04	1,01
Light blue	61	2,87	99	4,68	34	3,98	0,85
Yellow	32	1,50	23	1,09	1	0,12	0,11
Dark green	98	4,61	161	7,61	66	7,72	1,02
Light green	29	1,36	42	1,98	26	3,04	1,53
Brown	45	2,12	74	3,50	27	3,16	0,90
Multi-coloured	11	0,52	6	0,28			
other	31	1,46	13	0,61	3	0,35	0,57
No preference / no car	283	13,31	116	5,48			0,00
Total	2127	100	2117	100	855	100	

Black cars are significantly more desirable amongst young drivers. This preference diminishes with age. The trend for grey / silver is the other way around. It was significantly less likely that a young person would not have a colour preference (Chi<sup>2</sup>, p=,000). The watershed age for this was mid-30s.

Drivers who prefer black cars are significantly more likely to be in favour of a speed limit on motorways of 160; those with no colour preference are significantly more likely to be in favour of a speed limit on motorways of 100.

Persons who prefer black are significantly more likely to be annoyed with slower drivers in front of them. Drivers with no colour preference are significantly less likely to get annoyed (Chi-Square, p=,000). These results are partly supported by results from a German study, in which persons with a preference for black most frequently expressed irritation and tension while driving (Psychonomics, 2000).

There are no correlations between specific accident types and car colours (whether actual car colour or preferred car colour).

There were no significant differences found in the preferred colour between males and females: black and grey led the way, followed by dark blue and "don't mind". See details in the table below:

Preferred colour	Women		Men	
	Frequency	Percent	Frequency	Percent
Silver, grey	177	17,66	227	20,30
Black	240	23,95	271	24,24
White	42	4,19	36	3,22
Dark red	60	5,99	83	7,42
Light red	62	6,19	66	5,90
Dark blue	119	11,88	150	13,42
Light blue	34	3,39	27	2,42
Yellow	18	1,80	13	1,16
Dark green	49	4,89	49	4,38
Light green	19	1,90	10	0,89
Brown	18	1,80	27	2,42
Multi-coloured	8	0,80	3	0,27
Other	18	1,80	13	1,16
No preference / no car	138	13,77	143	12,79
total	1002	100	1118	100

## 7.3. Attitudes

### 7.3.1. Speed limits

In relation to the current speed limit on Austrian motorways of 130 km/h, the 2128 car drivers were asked if they preferred another speed limit. Higher speed limits were much more popular amongst men, as seen in the following table:

What speed limit would you like to have on motorways:

Speed limit	All respondents in %	Women in %	Men in %
100	3,4%	4,09	2,77
130	57,1%	65,97	49,06
160	23,0%	17,86	27,61
Unlimited	10,5%	5,29	15,28
Other	4,1%	5,09	3,31
Don't know	1,8%	1,70	1,88

Those who chose 160 km/h on the motorway are significantly more likely to suffer from stress while driving and more likely to get irritated by slower drivers in front of them.

By contrast, those who opted for 'unlimited' speed limits on the motorway are significantly more likely never to be stressed while driving.

Those who prefer to keep the 130 km/h limit get more irritated by drivers pressurising them from behind, but significantly less by slower drivers in front of them (Chi-Square,  $p=,000$ ).

### 7.3.2. Priority for pedestrians at crossings

85,8% of those surveyed think it is right that pedestrians have priority at zebra crossings, 8,9% find it bad, and 5,2% had no answer.

Men are statistically more likely to find priority for pedestrians a bad thing, compared to women ( $p=,000$ ).

Those who think it is good for pedestrians to have priority at zebra crossings are significantly less likely to be irritated by slower drivers in front. Those who think pedestrian priority is bad are significantly more likely to be irritated by slower drivers in front ( $p=,000$ ).

### 7.3.3. Experiencing stress

#### **Stress:**

In response to the question "how frequently do you experience stress while driving", 22,4% answered almost never, 43,6% now and then, 26% frequently and 7,9% almost always.

Differences between the sexes were significant with regard to this question: (Chi-Square,  $p=,000$ ), women experience more stress than men:

30,9% of women, compared to only 21,8% of males regularly experience stress. On the other hand, only 17,7% of women, compared to 26,8% of men hardly ever experience stress.

#### **Drivers pressurising from behind:**

With regard to these drivers, 24% of those surveyed hardly ever got irritated, 33,8% now and then, 24,7% frequently and 17,5% almost always.

The difference between sexes was also significant here (Chi-Square,  $p=,000$ ), Women are more irritated by drivers pressurising them from behind than men:

28,9% of women, but only 20,9% of men regularly get irritated by drivers pressurising them from behind. Only 17,2% of women hardly ever get irritated, compared to 30,3% of men.

#### **Slower drivers:**

22,2% of those surveyed hardly ever got upset with this type of driver, 36,3% now and then, 25,5% frequently and 15,9% almost always.

The difference between sexes was also significant here (Chi-Square,  $p=,000$ ): women are less inclined to be upset than men:

23,4% of women, compared to 27,5% of men get frequently irritated by slower drivers in front of them. By contrast, 24,9% of women, compared to only 19,8% of men, are hardly ever irritated by slower drivers.

The results of this study, in which women are more irritated by being pressurised from behind, and men are more irritated by slower drivers in front, are borne out by the results of a German study (Psychonomics, 2000).

Another important conclusion is that persons who tend to get irritated by drivers pressurising from behind also get irritated by slower drivers in front, whereas those who hardly ever get irritated by drivers behind will not get irritated by those in front (Chi-Square,  $p=,000$ ). Clearly, one can distinguish between people who are either more or less likely to get irritated altogether.

### **7.3.4. Automatic gear shift**

20,4% of those surveyed preferred automatic, 67,7% manual and for 11,8% it made no difference.

Automatic gear shift was preferred almost exclusively for the comfort factor. For those who preferred manual, 28,3% said it was because they felt they had everything in control. 25,4% because of its sportiness, 5,3% said automatic was too complicated and 7,9% named other reasons.

There is no statistical difference in accident frequency between those who prefer automatic cars and those who prefer manual.

Those persons that felt manual gears were more sporty were significantly more likely to get annoyed by slower drivers in front (Chi-Square,  $p=,000$ ).

### **7.3.5. Conclusions with regard to attitudes**

The main results of this section can be summarised by forming the following conclusions:

“the dominant driver“:

- Preferred colour black
- Preferred speed limit on the motorway 160 km/h
- Manual gears because it's sportier
- Priority for pedestrians at zebra crossings is frowned upon
- Clear irritation towards slower drivers in front of them

“the relaxed driver“:

- No preference in car colour
- Priority for pedestrians at zebra crossings is seen positively
- Less irritation towards slower drivers in front of them, pressurising drivers behind and generally less stress in traffic

The most fundamental result here is that these factors have no significant correlation with accidents. This corresponds to the basic result of this study which shows that accidents are primarily caused by factors which apply to all drivers, independent of character, such as inattentiveness, stress and thoughtlessness, rather than applying to specific types of driver.

The slightly elevated accident factor with regard to light red and black cars (chap. 7.2) may be explained by additional personal risk factors. Psychologically speaking, red can stand for aggression, black for striving for dominance.

## 7.4. The image of car brands

Respondents were asked whether one of the following statements corresponded, in their opinion, to a particular brand of car. They were asked to imagine a large 4-door saloon, such as the Passat from Volkswagen. First, the statements were read out, then all the car brands were read out and then the interviewee had to decide.

The results clearly show that car brands have clear images attached to them.

- The control item “I am weak“, was expected to be used in a clearly different way to the other largely positive statements. 63% were not able to assign this label to any of the brands, leaving 18% for Volkswagen und 11% for Alfa Romeo.
- “I am rich“ was mostly assigned to Jaguar (52%), with Mercedes some way behind (26%).
- The relative statement “actually I am the richest and strongest“ was assigned in equal measure to BMW, Jaguar and Mercedes (27%).
- “I am different“ was clearly felt to apply to Alfa: 37%, followed by Jaguar with 20%.
- Calm and relaxedness was attributed first to Mercedes (30%), followed by Volkswagen with 23% and Audi with 20%.
- One statement aimed to see if a car brand could be associated with establishment: “I belong to the group who made it“. BMW came first with 23%, closely followed by Audi with 21%. BMW was more strongly associated with the statements “I am strong“ und “actually I am the richest and strongest“. Rather, this statement was the most defining one for Audi. This shows that Audi does not quite enjoy the status earned by the other Germany brands of BMW and Mercedes.
- “I am socially-oriented“ was associated with Volkswagen with 41% or with no brand (40%).
- “I am strong“ corresponded most strongly to BMW (41%).

- “I am passionate“ was associated most clearly with Alfa Romeo: 41%.

The details are presented in the table below. Differences between the sexes were not statistically significant:

Table: Which statement corresponds to which car brand?

Statement:	Alfa	Audi	BMW	Jaguar	Mercedes	Volkswagen	None	Total
I am weak!	10,58	2,68	3,10	1,13	1,55	17,64	63,31	100
I am rich!	1,42	7,64	10,05	51,51	26,18	0,66	2,55	100
Actually I am the strongest and the richest!	1,93	7,17	27,72	27,96	26,40	0,99	7,83	100
I am different!	36,904	8,589	7,08	20,06	4,96	6,89	15,53	100
I am calm and relaxed	3,22	19,95	4,27	4,83	29,48	23,41	14,83	100
I belong to those who have made it!	5,52	20,79	22,68	8,16	16,83	13,77	12,26	100
I am socially-oriented!	3,93	8,05	1,75	0,99	4,69	41,03	39,56	100
I am strong!	7,15	13,13	40,66	19,29	11,95	2,87	4,94	100
I am passionate!	40,67	8,95	13,76	17,77	3,44	2,83	12,58	100

Value in percent, n=2112 respondents

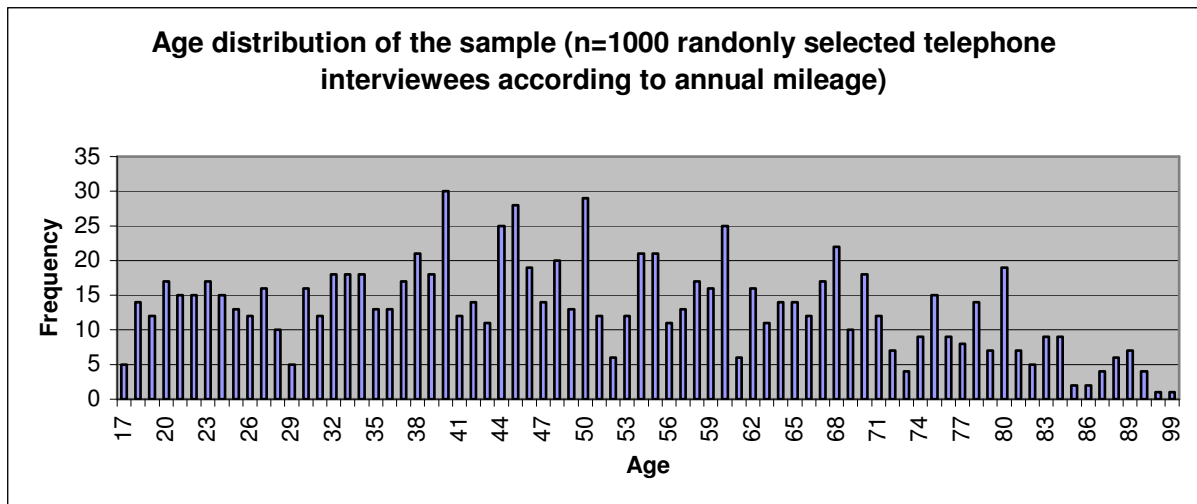
## 7.5. Accidents in relation to age, kilometers driven, population and sex

In the following separate section of this research project, the accident risk of the Austrian population was calculated according to age and mileage. Accident data was taken from the year 2005. Official Austrian census data according to age and sex was taken for 2004. Both data sets came from Statistik Austria.

The mileage of Austrians was collected via telephone interviews. At the end of April 2006 1000 Austrians were randomly selected from telephone books from the federal states of Vorarlberg, Salzburg, Upper Austria, Lower Austria and Vienna. They were asked about their mileage, whether they held a driving licence and of course what age and sex they were. Only in this way could it be ascertained that older people drive less and also are less likely to hold a driving licence. The raw accident data from Statistik Austria only shows that older drivers have a lot less accidents. But this does not take the lower exposure of older people into account.

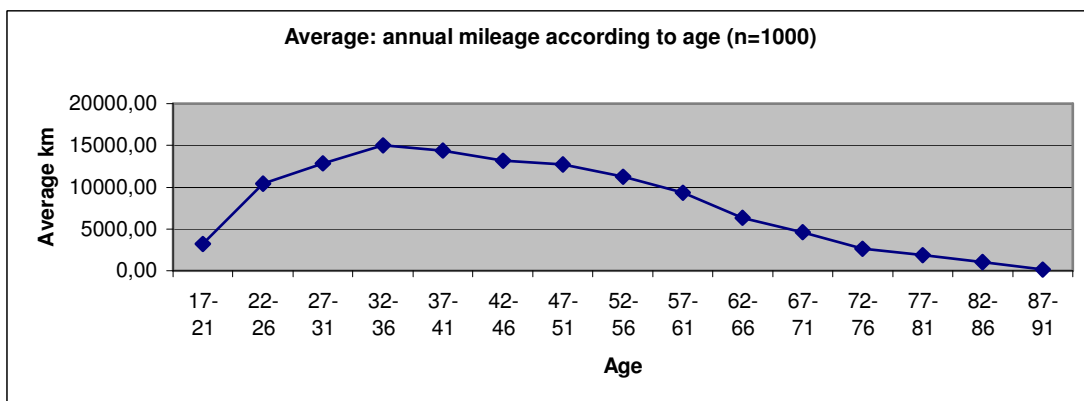
The age distribution of the randomly selected sample from the telephone interviews corresponds approximately to the age distribution of the Austrians (see diagram below). The sex distribution also correlates: 53,4% women and 46,6% men. The readiness to participate in the interviews was high because it was only a short series of questions. About 1 in every 47 persons was willing to take part. The results can therefore be extrapolated.



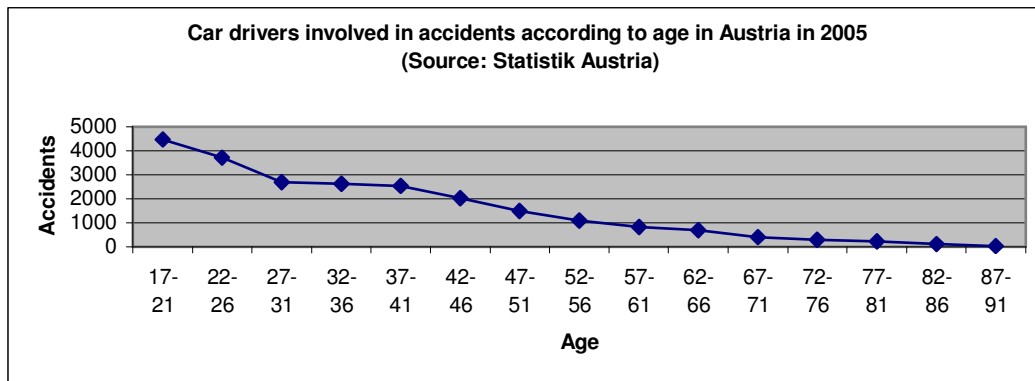


86% of Austrians from 17 years old hold a driving licence, according to the telephone interview results (14% do not). Possession of a driving licence drops significantly with increasing age.

The average annual mileage was, as expected, less amongst young and older drivers, as shown in the graph below. This average mileage relates not just to drivers but to all Austrians – so here it should be mentioned that a large percentage of the older population does not drive at all. This is essential for calculating the accident risk per age group:



The number of car drivers involved in accidents decreases with increasing age. See the graph below, with absolute figures from Statistik Austria:



Even when the number of accidents is compared to the population statistics, there is a continual decrease in accident rate. However, this does not say anything about the actual accident risk of car drivers according to age. Only when the kilometers driven is determined can the actual accident risk be determined.

To calculate the actual accident risk of Austrian car drivers according to age, the exposure of each age group was calculated and compared to the accidents:

Exposure according to age group:

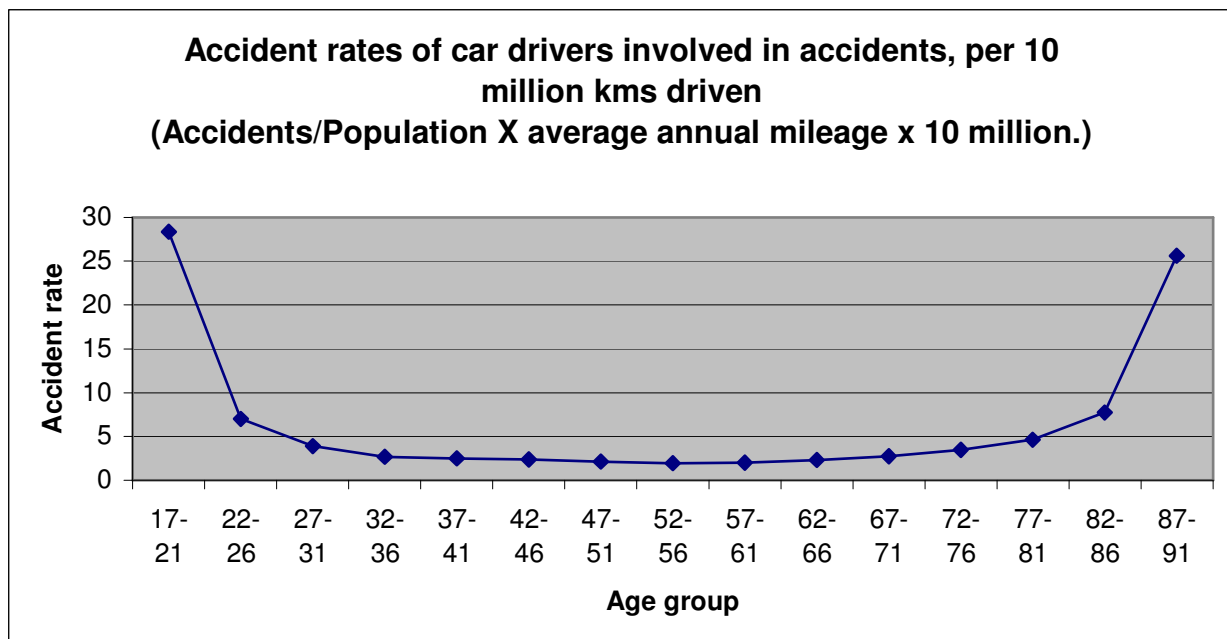
Number of Austrians according to age group x average mileage.

Calculation of the accident risk for Austrians according to age group and per car-driven kilometer can be calculated using the following formula:

$$\frac{\text{Number of car drivers in accidents according to age group}}{\text{Exposure}}$$

To make the results clearer, they were multiplied by 10 million. Statistically seen, the accident risk portrayed in the graph below can be interpreted as follows:

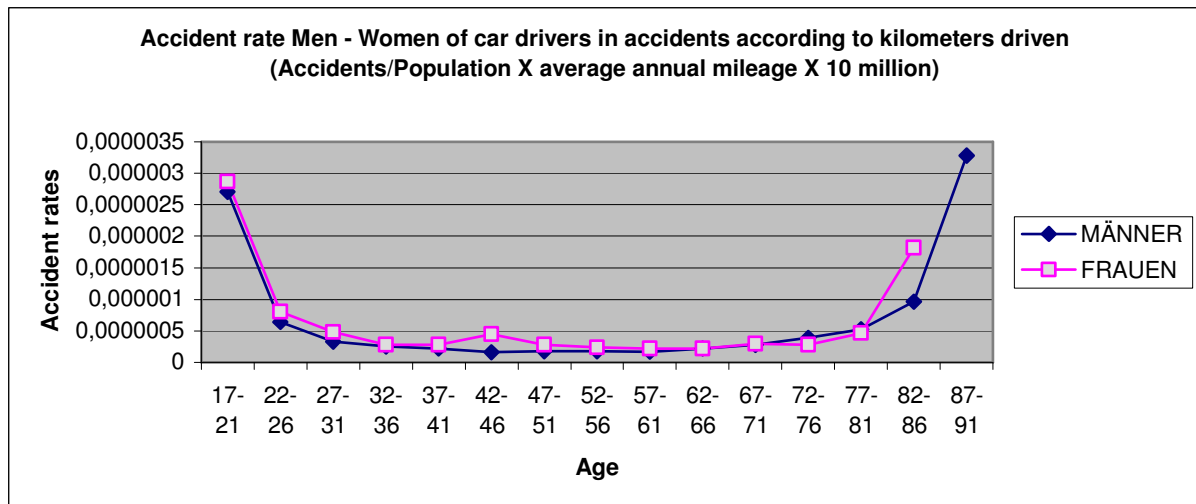
For every 10 million kilometers driven by 17-21 year old Austrian car drivers, 28 have accidents in this age group every year. This constitutes an accident risk which is 12 times higher than that of a driver between 32 and 61, whose accident risk is 2,3 accidents per 10 million kilometers driven. Austrians between 72 and 76 have 1,5 more chance of an accident compared to an average-aged driver, for drivers between 77 and 81 it is 2 times higher, for 82 to 86 year olds it is 3,3 times higher and for 87 to 91 year olds it is 11 times higher. See the graph below. (The age categories are split into periods of 5 years, starting at the age of 17):



In the framework of international research, only one study could be found on this theme. It relates to Sweden (Mattsson & Grummas Granström, 2000). The methods and results of the Swedish study are generally comparable to this current study. Youngsters around 20 years old in Sweden have nine times more risk of an accident than middle-aged drivers. Drivers in their mid-70s have twice as much accident risk and this accident risk increases strongly with age, until persons in their mid-80s who have 8 times more risk of an accident.

This means that older drivers only have less accidents because there are less old people in the population, they drive more seldomly and they drive less kilometers – so they have far less exposure. Taking this exposure into account, older people who drive have a significantly higher probability of being involved in an accident. This high risk also applies to young drivers.

With regard to exposure and sex distribution there is very little difference between the accident risk (resulting in personal injury) of men in comparison to women. See graph below (for women between 87 and 91 there was no information available as a result of the telephone interviews, so no risk data features here):



In summary, one can conclude that the reason why men have more accidents than women is because more of them drive and because they drive more kilometers. Taking into account exposure in accident risk, this means that women may even have a tendency to have more probability of an accident as a car driver than men.

## 8. Discussion of the results

Traffic accidents have risen by 7% in the last 10 years. Whereas 38253 accidents were registered in Austria in 1996, this number was 40896 by 2005. The number of road fatalities did indeed drop in this period by 25%. But this reduction can be primarily explained by better post-accident care and safer vehicle technology. Measures designed to positively influence traffic behaviour can only be considered as contributory factors to a very minor degree.

It is therefore time to test the road safety policy which has been in place until now. First of all, fundamental research into traffic behaviour is required. The current study's objective was to analyse in depth the behavioural causes of accidents so road safety measures can be improved as a result.

2128 car drivers were interviewed by psychologists, in which 852 road accidents (material damage and personal injury) were investigated. The advantage of the interviews was that the underlying causes of the accident could be identified, items which the police could not objectively ascertain at the site of the accident (fatigue, inattentiveness, motives...).

The most fundamental result of the study was that inattentiveness, rather than aggressive behaviour of peripheral groups, was by far the most common cause of accidents (36%). Excessive speed and too little safety margins were primarily caused by stress and thoughtlessness, rather than dominant or aggressive behaviour. There is a potential accident waiting inside of all of us.

Maycock (1995, 2002) also found, in a survey of 965 male drivers who had accidents, that inattentiveness was by far the main cause of the accidents caused by these drivers (across all age groups). This current study now extends the results to both

sexes and goes one step further by asking: what were the reasons for this inattentiveness?

Negative 'extra motives' were only found to be accident-causing factors amongst young drivers (wanting to experience risk, to test oneself, experience power...).

These results conform to findings in, for example, the international literature review of Engström et al. (2003) on the accident risk of young drivers or as summarised in Kroj und Schulze (2002), in which 37,4% of young drivers manifested risky attitudes. These 37,4% are in fact responsible for 54% of all accidents amongst youngsters. La Cour Sell (2006) reported for Denmark that 3% of youngsters showed highly risky tendencies and that these 3% were responsible for 20% of the accidents. A further 10% showed moderate risky tendencies and they were responsible for 40% of accidents. As mentioned above, the primary accident cause 'inattentiveness' is joined by emotional driving motives, combined with incorrect self-assessment of the youngster's limited driving experience.

It would therefore make sense to concentrate road safety work on the message of 'concentrating on the driving task' and 'how to handle stress'. Instead of the slogan "foot off the gas pedal, stay alive", the slogan "Drive focussed, stay alive" would be more appropriate.

The road environment should also be designed to raise attention levels.

It also seems to be a key point that junctions could be designed to reduce accident risk. Accidents at junctions in combination with inattentiveness were by far the most common accidents. In a recent German study, a clear reduction in speed at junctions could be achieved only by laying plaster rather than asphalt in the area of the junction (Friedel et al, 2006). In this way "self-explanatory streets" can substantially influence traffic behaviour.

In the Dutch towns of Haren, Drachten und Makkinga they have gone even further: mostly all signposts and road markings have been removed ([www.shared-space.org](http://www.shared-space.org)). According to media reports, accident reductions have taken place as a result. A traffic system with little regulation leads to an increase in attentiveness amongst road users, which as this current study shows can have an accident-decreasing effect. The more demands the road environment places on the driver, the less the driver will be inclined to think about other things, to have conversations, etc.

In terms of road design, it should also be ensured that drivers are regularly reminded of the need for two second safety margins. This is because lack of thought was the most frequent accident cause in those involving insufficient safety margins.

In the Austrian road safety program, inattentiveness – the main cause of accidents according to this study – is not even mentioned. Nor was it one of the 13 accident causes surveyed on a pan-European basis in the EU SARTRE study.

There were no indications in this study of a correlation between personality types and accidents. Even those who could be described as dominant were generally not significantly more likely to cause an accident.

Young drivers, on the other hand, were over-represented in single-vehicle accidents, were more likely to have more serious accidents and had emotions which were more likely to influence their motives and driving behaviour in determining the primary accident cause: enjoying speed, readiness to take risks and sensation-seeking.

42% of all accidents were primarily caused by an imbalance in emotional state. These were primarily stress, worries, etc; namely states that distracted the driver from the driving task and that were not lifestyle tendencies influencing driver behaviour (so not driving for fun, to show off, etc). These emotional states tended to negatively influence driving behaviour (e.g. stress and being in a hurry led to excessive speed and driving too close to the vehicle in front). It would therefore seem important to learn self-management techniques and to increase awareness of the effects of stress on accident risk.

Excessively demanding driving situations do not seem to be the main problem in accidents; rather it is our excessively demanding and stressful lifestyles. Only 6,6% of accident causes could be attributed to excessively demanding situations. Rather, the problem of drivers not being taxed enough while driving, whereby drivers can easily be distracted, seems to be a priority for future road safety work.

With regard to the GDE matrix (Goals for Driver Education), which is State of the Art in EU expert circles at the moment (e.g. Keskinen, 1996), the results of this study can be interpreted in a key way. The GDE-Matrix is a structure which, based on empirical research results, can be described as a 4-level hierarchical model (see EU projects GADGET, MERIT, Advanced, Basic, NovEv...):

4. Personal motives and attitudes
3. Influences through driving motives and other circumstances of the trip and the driver
2. Mastery of a range of traffic situations
1. Vehicle control

Accident causes can be attributed to each of the 4 levels:

The most frequent accident causes are inattentiveness and distraction, which can be attributed to level 3 of the matrix: influences during the trip and driving motivations. Stress and thoughtlessness can be attributed to this level. Level 2, mastery of traffic situations, is significant for novice drivers, but not a priority. Lack of experience is a primary cause of accidents amongst novice drivers. An accurate self-assessment should therefore be a worthy goal, combined with experiencing a range of different traffic situations, in particular during the 1st of the 2 feedback drivers in the Austrian 2nd phase training.

For the first time in Austria, the extremely high accident risk of older drivers (from late 70s onwards) and younger drivers has become apparent, based on exposure (kilometers driven from a survey involving 1000 randomly selected telephone interviewees, population distributions and the number of drivers who have had accidents per age group). The first two years of the Austrian multiphase training has led to reductions in risk for young drivers. There have been 10,3% less accidents amongst 18 and 19 year old drivers Accident levels for other age groups fell by only 3,2% during the same period (Bartl, 2006 and Bartl & Esberger, 2006).

Medium-term specially targeted measures should be devised and tested for older drivers, from late 70s onwards, rather than continuing the taboo on this controversial topic. It would be important, as a first step, to inform senior drivers about the accident types they are most likely to be involved in (Bartl, 2005) and in particular to inform them of the dangers of falling asleep while driving in the afternoon (Pack et al, 1995).

The fact that the majority of accidents cannot be attributed to the highest level of the GDE matrix, namely shortcomings in personality or attitude, shows that most drivers are 'normal' in this respect. Road safety campaigns that are directed towards all drivers and primarily focus on the right personal attitudes are unlikely to be effective. False beliefs could emerge, such that on average 29% of all accidents involve drink-drivers. In reality, this figure is only 6%. One-sided campaigns and news reports distract our attention from the fact that there is a potential accident in all of us, particularly when we are not being attentive.

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## **10. Annex – Interview forms**

Interviewer:..... Selection criteria: <input type="checkbox"/> VPU <input type="checkbox"/> MEP <input type="checkbox"/> Rehabilitation <input type="checkbox"/> instructor / trainer <input type="checkbox"/> traffic psych. <input type="checkbox"/> other Date:..... Federal state: <input type="checkbox"/> W <input type="checkbox"/> NÖ <input type="checkbox"/> Bgl. <input type="checkbox"/> OÖ <input type="checkbox"/> S <input type="checkbox"/> T <input type="checkbox"/> Vlb. <input type="checkbox"/> Stmk. <input type="checkbox"/> K
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### **Standardised in-depth interview with car drivers:**

(Interviewer: ask first unsupported, then supported. When supported, it is important always to read out all the possible answers in advance)

**1. What in your opinion is the main cause of accidents** (Interviewer: Follow-up as much as possible regarding the response, e.g.. “due to excessive speed“ –why do you think people speed and then have accidents? If, on the other hand, underlying causes are evoked, e.g. aggression, stress, then ask what type of accident that is likely to lead to. Driving too fast, too little safety margins?)

#### **due to lack of safety margins**

- 1.1  due to stress or being in a hurry
- 1.2  due to thoughtlessness
- 1.3  due to irritation or aggression
- 1.4  due to frustration or showing off
- 1.5  due to fun, enjoying risk, sensation seeking
- 1.6  experiencing power, showing off
- 1.7  what other reason.....

#### **due to excessive speed for the situation in hand:**

- 1.8  due to stress or being in a hurry
- 1.9  due to Thoughtlessness
- 1.10  due to irritation or aggression
- 1.11  due to frustration or showing off
- 1.12  due to fun, enjoying risk, sensation seeking
- 1.13  experiencing power, showing off
- 1.14  testing one's own skills or testing the car
- 1.15  what other reason.....

#### **Inattentiveness / distraction (not paying attention due to...)**

- 1.16  due to inner thoughts
- 1.17  due to mobile phone
- 1.18  due to intensive conversation in car
- 1.19  due to other activity (radio, smoking, eating...)
- 1.20  due to distracting activities with child-passenger
- 1.21  due to something interesting on the street
- 1.22  due to other.....

#### **1.23 Fatigue**

1.24  **Excessively demanding situation (due to lack of ability of skills) due to** (e.g. delayed or incorrect reaction to excessively demanding situation, everything happened too quickly, overlooking something because too much was happening at the same time, over-reacting, just not ready for it...everything as long as the driver is fit..otherwise it would be down to fatigue, distraction. For cases where general driving experience would not help either).

1.25  **Incorrect assessment of the situation due to a lack of experience with such situations** overlooking something due to lack of experience e.g. blind spot or

A-, B-, C-post, a pedestrian crossing the street without looking, the person in front brakes when the traffic lights are on yellow...so skills would be there, but experience is lacking.

1.26  **Sudden unexpected external occurrences** (unexpected oil slick, sun suddenly dazzles driver, really unexpected slipperiness in this place ....)

1.27  **Alcohol-related**

1.28  **Drug-related**

1.29  **Other:** .....

**2. Do you think that one's emotional state is a primary cause of accidents?** (Irritation, sadness, stress, joy of risk, showing off, ...so psychologically out of balance...) 2.1  yes 2.2  no

**3. How frequently do people drink and drive:** (Percent: .....)

**4. How frequently do people drive under the influence of drugs:** (Percent: .....)

**5. The colour of your car is (or the car you drive):**

(light is light-to-moderate. E.g. Ferrari-red is light red)

5.1  silver / grey 5.2  black 5.3  white 5.4  dark red 5.5  light red  
5.6  dark blue 5.7  light blue 5.8  yellow 5.9  dark green 5.10  light green  
5.11  brown / gold 5.12  multi-coloured 5.13  other.....5.14  have no car

**6. My favourite car colour would be:**

6.1  silver / grey 6.2  black 6.3  white 6.4  dark red 6.5  light red  
6.6  dark blue 6.7  light blue 6.8  yellow 6.9  dark green 6.10  light green  
6.11  brown / gold 6.12  multi-coloured 6.13  other.....6.14  none/ no pref.

**7. You have driven .....km in the last 12 months.** (Interviewer: make sure you help the person in order to get the most accurate response)

**8. B-driving licence since: Year ..... Month .....**  
**ever withdrawn** 8.1  No 8.2  Yes, in total ..... times

**9. D.O.B: Year ... Month .....**

**10. Sex:** 10.1  Woman 10.2  Man

**11. What do you prefer?**

11.1  **Automatic** 11.4  **manual** 11.9  **don't know**  
11.2  more comfortable 11.5  because sporty  
11.3  others..... 11.6  because everything is under control  
11.7  because automatics are too complicated  
11.8  others.....

**12. My preferred speed limit on the motorway would be:**

12.1  100 12.2  130 12.3  160 12.4  unlimited 12.5  other .... 12.6  don't know

**13. Pedestrians have priority on zebra crossings. You find this:**

13.1  good      13.2  bad      13.3  don't know

**14. How regularly do you experience stress while driving?**

14.1  almost never    14.2  now and then    14.3  frequently    14.4  almost always

**15. Do you get irritated by pressurising drivers behind you?**

15.1  almost never    15.2  now and then    15.3  frequently    15.4  almost always

**16. Do you get irritated by slower drivers in front of you?**

16.1  almost never    16.2  now and then    16.3  frequently    16.4  almost always

**17. Do any of the following statements correspond to the following car brands??**

Interviewer: Imagine a 4-door saloon, so a big car, like a Passat from Volkswagen. Important: I will read everything out to you first: there are 9 short statements and 6 brands of car. Only then we will go through everything. It is possible that a statement applies to no brand.

	1 Alfa	2 Audi	3 BMW	4 Jaguar	5 Mercedes	6	7 None
1 I am weak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 I am rich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Actually I am the strongest and the richest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 I am different	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 I am calm and relaxed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 I belong to those who have made it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 I am socially-oriented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 I am strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 I am passionate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**18. Have you had one or more accidents as a car driver in the last 5 years, which you were responsible for, even if there was only very little material damage?**

Number.....

If 0 END here. If there is one or more accidents to investigate, please go to Interview form "Accident" (one per accident). N.B. Please staple together to ensure proper classification. THANK YOU

**Standardised in-depth interviews for car drivers who have had accidents in the last 5 years, which they were responsible for:**

(Interviewer: ask first unsupported, then supported. When supported, it is important always to read out all the possible answers in advance)

### 19. When was the accident:

Year..... Month..... Day of week..... Time of day..... Hour.....

For novice drivers (first three years): The accident was ..... Months after gaining the licence (0-36 months)

20. Where did the accident happen: 20.1  Urban 20.2  Rural

21. The road surface was: 21.1  dry 21.2  slippery

22. The light was: 22.1  day 22.2  night 22.3  dusk 22.4  foggy

### 23. Gravity of accident:

23.1  light material damage (up to 500 Euro)

23.2  moderate to severe material damage

23.3  personal injury

### 24. The type of accident was:

24.1  front-rear collision in same line of traffic

24.2  lateral collision in same line of traffic

24.3  oncoming traffic (typical overtaking accident)

24.4  junction accident (collisions from angle)

24.5  Single-vehicle accident (e.g. leaving the road...)

24.6  Wild animals with swerving

24.7  Wild animals without swerving

24.8  Pedestrian accident

24.9  Parking or reversing (very low speed)

24.10  What other accident .....

**25. Primary cause of accident (Interviewer: The answer will be very clear to you if you think back to what you would have done differently 10 seconds before the crash. Or what have you learned and what do you do differently now. Please no nonsense responses such as: I wouldn't have driven, would have taken another route..."**

### Too small safety margins

25.1  due to stress or being in a hurry

25.2  due to thoughtlessness

25.3  due to irritation or aggression

25.3  due to frustration or showing off

25.4  due to fun, risk-taking, sensation-seeking

25.5  experiencing power, showing off

25.6  what other reason.....

### Were you driving too quickly for the circumstances

25.7  due to stress or being in a hurry

25.8  due to thoughtlessness

25.9  due to irritation or aggression

25.10  due to frustration or showing off

25.11  due to fun, enjoying risk, sensation seeking

25.12  experiencing power, showing off

- 25.13  testing own skills, testing car  
 25.14  what other reason.....

**Inattentiveness / distraction (wasn't on top of things, due to)**

- 25.15  due to my thoughts  
 25.16  due to mobile phone  
 25.17  due to intensive conversation in car  
 25.18  due to other activity (radio, smoking, eating)  
 25.19  due to distracting activity with child-passenger  
 25.20  due to something interesting on the street  
 25.21  due to other.....

**25.22  Fatigue**

25.23  **Excessively demanding situation (due to lack of ability of skills) due to** (e.g. delayed or incorrect reaction to excessively demanding situation, everything happened too quickly, overlooking something because too much was happening at the same time, over-reacting, just not ready for it...everything as long as the driver is fit..otherwise it would be down to fatigue, distraction. For cases where general driving experience would not help either).

25.24  **Incorrect assessment of the situation due to a lack of experience with such situations** overlooking something due to lack of experience e.g. blind spot or A-, B-, C-post, a pedestrian crossing the street without looking, the person in front brakes when the traffic lights are on yellow...so skills would be there, but experience is lacking.

25.25  **Sudden unexpected external occurrences** unexpected oil slick, dazzled by the sun, really unexpected slipperiness, sudden wild animals...

25.26  **Alcohol-related** (so primarily due to)

25.27  **Drug-related** (so primarily due to)

25.28  **Other:** .....

**26. Can one say that your accident was primarily caused by your emotional state?**

(irritation, stress, joy of risk....) 26.1  yes 26.2  no

**27. Had you been drinking when the accident occurred** (even if you think alcohol was not the primary factor): 27.1  no 27.2  yes (Promille.....)

**28. Were you under the influence of drugs:** (even if you think drugs were not the primary factor): 28.1  no 28.2  yes (which.....)

**29. The colour of the car you had the accident in was:**

- 29.1  silver / grey 29.2  black 29.3  white 29.4  dark red 29.5  light red  
 29.6  dark blue 29.7  light blue 29.8  yellow 29.9  dark green 29.10  light green  
 29.11  brown / gold 29.12  multi-coloured 29.13  other.....

**30. You drove a total of about .....kms in the 12 months prior to the accident.** (Interviewer: be sure to help the driver to get the most accurate response possible.)

Thank you