CHALMERS

Culture Differences Analysis

A Comparison between Chinese Drivers and Swedish Drivers on Driving Behaviors

Master of Science Thesis in the Programme Interaction Design

LIAN DUAN

Chalmers University of Technology
University of Gothenburg
Department of Computer Science and Engineering
Göteborg, Sweden, June 2012

Culture Differences Analysis
A Comparison between Chinese Drivers and Swedish Drivers on Driving Behaviors

LIAN DUANN

Examiner: FANG CHEN

Chalmers University of Technology
University of Gothenburg
Department of Computer Science and Engineering
SE-412 96 Göteborg
Sweden
Telephone + 46 (0)31-772 1000

Department of Computer Science and Engineering
Göteborg, Sweden June 2012

Table of Contents

Abstract

In order to support the development of ADAS for cars in China, a user experience study is made to compare the drive behaviors and demands between Swedish and Chinese drivers. This thesis elaborately describes the whole process of making a cross-culture study, both theoretically and practically. Questionnaire was designed step by step, and video clips were selected, in order to elicit useful information from drivers. An ADAS market survey was carried out. The driver segmentation was tested and verified. And an explorative way of experiment was carried out, using Hofstede`s 5 culture dimension model, with the attempt to find out the interior culture factors on the driving behaviors. The result of statistic analysis shows many differences of driving behaviors. It also indicates that there is a need to improve the questionnaire by modifying some of the questions.

1. Introduction

In recent years, the ADAS (Advanced Driving Assistance System) has a great success in the European market. According to [1], in 2007, 88% of all new vehicles produced in Europe had at least ABS on board, with 50% of new vehicles equipped with Electronic Stability Program (ESP). Although the statistics in China are 64% and 6% respectively, a tremendous increasing is foreseeable, as a result of the prosperity of Chinese vehicle industry. Along with the introduction of ADAS to China, the European local car companies and component providers gradually realized the importance of system adaption, not only the technical adaptation, but also the HMI (Human Machine Interaction) design to adapt to the driver's behavior and traffic situation in China.

One problem is, according to [2], the development of ADAS is generally based on perceptions about the needs of drivers in western countries, while driving behavior is highly environmentally and culturally mediated. The HMI designed of ADAS for drivers in Sweden may not necessarily be optimal in other markets. Lindgren [3] also points out that a system is considered useful in one country can be seen as almost worthless (or even harmful) in another one, and system settings feasible in one part of the world may not be suitable on the other side of the globe. Another study [4] shows different attitudes towards several types of ADAS between Swedish, American, and Chinese groups. It is believed that there is a higher requirement for re-design of the HMI on ADAS to adapt to Chinese market, due to the more complex traffic situation and driving culture in China. When regarding to the driver HMI design, the first step is to understand the drivers' behaviors and personalities, and the culture issue. This thesis work is to embark user experience studies, make comparison of driving behaviors and demands between Swedish and Chinese drivers, and investigate in the interior indicators of culture which may have an effect on driving behaviors.

2. Literature Review

There is a lack of studies on Chinese drivers and related to HMI design of ADAS systems in the literature. There are limited reports on Chinese traffic and drivers studies, but still lack of the necessary depth. However, I can still find some related literature in the following aspects respectively.

2.1 Traffic Situation in China

Xie [5] points out that in China, vehicle violations made a significant contribution to traffic accident involvement. Statistic shows 84.6% traffic accidents are caused by vehicle violations, which is the crucial factor within all traffic accidents [6]. In urban areas there is a higher rate of accidents involves pedestrians, while in suburban districts the higher rate of accidents is correlated with quadricycles. Besides, the rate of accidents involves bicycles and tricycles is also high in both urban and suburban areas [7]. Apart from the chaotic driving environment, which includes many vulnerable road users such as bicyclists and pedestrians [8], there are also infrastructural issues, such as the roads were constructed in the wrong way, which may confuse the driver, as well as poorly designed road signs or even a lack of them at road construction areas [9]. Besides, driving behavior is considered as a major safety problem. In 2008, the report of traffic police office in Zhejiang province (in China) showed that bad driving habits and poor understanding of and respect for road and safety regulations were the obvious problems [2]. Lee [10] claims that culture has a significant influence on driving behavior, and it plays a critical role in general driving safety.

In conclusion, the chaotic driving environment and bad design infrastructure both contribute traffic accident, but the major problem would be vehicle violations, which is due to bad driving behavior. However, driving behavior is highly related to environmental factor and culture.

2.2 Advanced Driving Assistance system Development in the Future

One of the biggest issues in ADAS operation is how the driver reacts to the factors like losing some of their driving autonomy [11]. For example, the automated lane departure prevention system may bring along with a feeling of loss of control to the driver, leaving uncertainty about what their role is in reacting appropriately to the automated response and possibly stressed by an unexpected intervention [12]. The Locus of control is a personal view about how external forces influence and control events in a person`s life. It is determined by the extent a driver attributes his/her own action as responsible for the behavior of the vehicle (internal locus of control), compared with the automated system action (external locus of control) [11]. It is unlikely to take the driver out of the loop in the near future, because drivers will not be willing to completely relinquish internal control, or that the infrastructure will not be developed sufficiently to fully autonomous vehicles [12]. Thus thorough consideration is needed when designing the locus of control. If the internal control is too much, the ADAS system will not be considered as efficient and the workload of driver is still high. However, more issues will be brought up, if the external control is too much (or too high automated extent).

Another problem is how drivers adapt to these changes. The potential issues are found in several aspects, for example, Rothengatter [13] suggests assistance system could cause mental underload and loss of skills, resulting in a decrease in driver reliability. Joshi [14] claims that the provision of information potentially leads to a situation where the driver's attention is diverted from traffic, and taking over (part of) the driving task by a co-driver system may well produce behavioral adaptation. Studies show out in traffic safety this adaptation may have negative consequences [11], for example, Dragutinovic [15] states that behavioral adaptations are potential increases in speed and decreases in mean time headway. In another study, expert points out that in some situation it could probably cause another accident when the drive is waken up by the system to get avoid of an accident [7].

Furthermore, there is a potential issue about the co-work of all the systems. This issue is not obvious today, because usually there are no more than three different active safety systems in one car. However, in the near future there may be many systems competing of the driver`s attention when they are implemented in a real driving situation [16]. This problem could be exacerbated when introducing an ADAS created for a western country to a market such as China, since there are large differences in infrastructure, traffic situations and driving behavior [5].

2.3 Previous Studies

Although very few, there are papers on the different behaviors and attitudes toward ADAS between Chinese and European culture, as well as some related studies. In this part, the conclusions of these studies will be summarized, and analyzed.

Lindgren [10] investigated the differences and similarities in attitude towards three different ADAS, using focus group discussions with Swedish, American, and Chinese participants. The results shows differences between the three groups regarding attitudes towards system feasibility, information presentation and need for system adjustability, and the factors such as driving conditions, infrastructure, and traffic regulations all seemed to influence the hypothesized usefulness of the different systems.

In [9], experts were invited to evaluate the video clips generated within naturalistic observation method. Expert opinions are given on what issues these situations raise and what assistance the drivers need to avoid being involved in more serious incidents.

In [7], research was conducted to discover the most common traffic problems that Chinese drivers are confronted with. These include how those problems differ from those for drivers in a country with a more developed driving culture (Sweden), and what consequences these differences will have for the design of Advanced Driver Assistance Systems. Results show that, even though there are similar traffic rules and regulations in Sweden and China, driving behavior is highly culturally mediated. Results also indicate that the type of assistance drivers need in different traffic situations depends a great deal on driving behavior. The observed differences between Swedish and Chinese drivers suggest that Advanced Driver Assistance Systems designed for roads in Sweden may not be optimal in China.

Heimgärtner [17] describes the concept, influence and use cases of cultural adaptability in driver information and assistance systems exemplified by driver navigation systems. In this procedure, researchers used IIA tool to investigate the culture differences, and found some considered variables have shown significant differences that therefore can be called cultural interaction indicators. For example, message distance denotes the temporal distance of showing the maneuver advice messages in the maneuver guidance test task.

Zhang [18] conducted some focus group discussions and a direct field observation for the Chinese drivers to explore driving attitudes, behaviors and safe driver characteristics, and a comparison between Chinese and US drivers were made. Results show that the Chinese drivers concentrate more on driving skills and capabilities, whereas the US drivers concentrate more on practical safe driving guidelines. Results also show there are a series of bad driving behaviors and misuse of equipments in China.

In conclusion, when comparing Chinese with Westerners in driving culture, different driving behaviors and attitudes are found, meanwhile, differences in infrastructure between countries obviously affect people's driving behaviors. Moreover, different attitudes toward ADAS are revealed. These differences suggest ADAS designed for roads in Sweden, or other developed countries, may not necessarily be optimal in China. Another, although Heimgärtner [17] provides cultural interaction indicators, the investigation is superficial, as these are just exterior indicators, but not reveal the interior cultural factors.

2.4 Research Method

Currently, ADAS design is highly technology-driven, which means that new functions are added when they are technical feasible rather than because they are needed [16]. Under this situation, at least two main drawbacks arise. Firstly, since the supporting technologies are often developed independently, the overall performance of the vehicle remains unknown. Secondly, mere feasibility of technology discards the view of a joint driver-vehicle system. Designing ADAS is therefore not only confronted with the mere implementation of advanced technologies, but should address implications for human operation as well [19].

An alternative approach to the traditional way of development and testing is to use a more user centered approach [20]. A user centered approach to design basically involves finding out as much as you can about the targeted users and then use this information when designing. The idea behind this approach is that the real users and their goals should be the driving force behind the development of a product, not the technology [21]. In fact, several studies can be found in designing of ADAS, with various interaction design methodologies, such as Personas, Focus Group Study, Questionnaire, Drive Simulation and Naturalistic Observations.

Although cultural aspects are difficult to measure and to manipulate through intervention, I nevertheless propose that it is possible to explore the effects of cultural factors on road safety through statistical study. Thus Questionnaire method is used in this study. A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents [22]. Since culture is the mind and behaviors in a group of people, I have to make a quantitive study, on as many people as possible. Using questionnaire is suitable for this aim, for it is easy to spread out to a large amount of people, and collect back. Another method is the Video Simulation. To understand the drivers` behaviors and different situations, especially in critical situations, some video clips are used to simulate the perspective of real drivers.

2.5 Culture Theory

In this study the Hofstede`s culture model was employed to investigate the difference of Chinese and Swedish drivers, and the Big-Five personality model was introduced during the drivers segmentation analysis.

2.5.1 Big-Five personality dimensions

The Big-Five framework enjoys considerable support and has become the most widely used and extensively researched model of personality [23]. It suggests that most individual differences in human personality can be classified into five broad, empirically derived domains, which are Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience. The most comprehensive instrument to measure the Big-Five dimensions is Costa and McCrae`s 240-item NEO Personality Inventory [24]. However, a 10-

item measure of the Big-Five dimensions named TIPI is offered for situations where very short measures are needed, which can stand as reasonable proxies for longer Big-Five instruments [23].

2.5.2 Hofstede`s 5-Dimension Culture Model

According to Hofstede [25], culture is the collective programming of the mind that distinguishes the members of one group or category of people from others. Human nature is what all human beings. And the personality of an individual, is her or his unique personal set of mental programs that needn`t be shared with any other human being (Figure 1). This model is the theory basis of this study, that why the culture factor is investigated, to distinguish Chinese and Swedes.

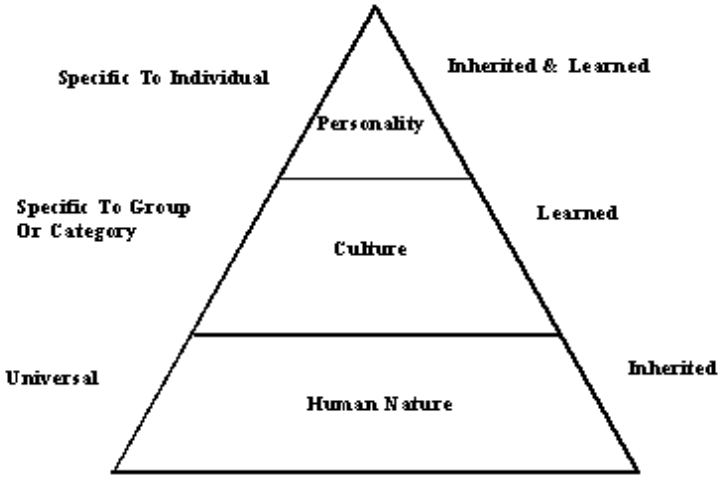

Figure 2.1 Hofstede`s pyramid model of Human Nature and Culture

But how can we study on the differences of culture? There are different theories about different dimensions of culture that are developed from social and organizational perspective, one of the most common used concepts is Hofstede`s [25] five culture dimensions. He conducted an important study of values associated with work among employees of a multinational company with branches in more than 40 countries [26]. The following five dimensions were sufficient to distinguish among cultures:

1. Power Distance: the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally.
2. Individualism/Collectivism: Individualism pertains to societies in which the ties between individuals are loose, while Collectivism pertains to societies in which people from birth onward are integrated into strong, cohesive in-groups.
3. Masculinity/Femininity: a society is called masculine when emotional gender roles are clearly distinct, while a society is called feminine when emotional gender roles overlap.
4. Uncertainty Avoidance: the extent to which the members of a culture feel threatened by ambiguous or unknown situations.
5. Long-Term/Short-Term: Long-Term orientation stands for the fostering of virtues oriented toward future rewards, the opposite pole, Short-Term orientation, stands for the fostering of virtues related to the past and present.

According to this theory, every country has a value in each dimension, from the result of a comprehensive study on the people in this country. Within each dimension, the extent of culture difference between two countries is revealed by the distance between their values.

Hofstede has categorized each dimension into two types of society, and made arbitrary rules for classifying the values as belonging to one type or another. And he summarized dozens of pairs of norms for each dimension. The norms in each pair respectively stand for the opposite two types of societies. So, there are many norms correlated with e.g. Individualism society, along with their corresponding norms correlated with Collectivism society.

2.5.3 Research questions and hypothesis

H1. There is a higher installation of ADAS in Sweden than that in China.
H2. There is a significant difference between Swedish and Chinese drivers` and acceptance and preference in ADAS.
H3. The driving behaviors are obviously different among the 4 types of drivers, and there is a different proportion among the 4 types of drivers between Sweden and China.
H4. The norms we have created on traffic and in-car system have a correlation with the corresponding general culture norms.
H5. Swedish and Chinese drivers are different in some of the norms on traffic or in-car system norms, and the difference can be revealed by the interior general culture norms.
H6. There are different driving behaviors, attitudes, and cognition between Swedish and Chinese drivers in the simulated real scenarios.

3. Methods

This chapter will introduce all the methods of this study, including the experiment design, plan, and the implement process.

3.1 Questionnaire & Video Design

This questionnaire is design by me and along with my supervisor. It is designed into several parts. Most of the questions are designed into closed-questions, that is, multiple choices or scales or inventory, for the convenience of statistic analysis. One problem is that the video simulation part seems take too long time for participants to complete, so I decided to divide this study into a questionnaire part and a video simulation interview part. On one hand, I could interview people with questionnaire and video, on the other hand, the questionnaire could be easy to spread to even many more people.

The first part includes some general questions about the ADAS using situation. Here lists several common used ADAS like ACC (Adaptive Cruse Control), FCW (Forward Collision Warning), and BSD (Blind Spot Detection) and so on. However, some of the widely-used systems like ABS (Anti-locked Braking System) or ESP (Electronic Stability Program) is not taken into consideration, because they work in an automatic manner but not interacted with human behaviour. Questions are asked (if they have ADAS) about what kind of system in the car, the use frequency, if they know how to use and so on, on the other hand, if they believe it is a good thing, and if they would like to have one system in the car (if they do not have ADAS). This part is designed to get a general understanding of ADAS market, the using rate, willingness, and preferences of different culture groups. These data is useful that it reveals the different driving behaviours from another standpoint, and also makes sense in ADAS design strategy making for different markets.

The second part is transplanted from a previous study [27]. In this study, a drivers segmentation based on behaviours and attitudes was made. Firstly, four segments of drivers

were defined. And after a series of questions, the characteristics of each segment were summarized. This study was an essential first step in understanding drivers and creating solutions which will enhance driving behaviour. I made this part here with the aim to statistically validate the outcome of the segmentation.

The third part is the core of this questionnaire, which contains the culture factors. From the theory of Hofstede`s 5-dimension culture model, the norms of different society is know, but how can they be used in the traffic and system design is a challenge. There is no existing study about the cross-culture design on in-car systems, but there is a study about using this model for the designing of web pages [28]. Inspired by this method, I tried to explore the relations between the culture norms and driving behaviours. The first step was to select some pairs of the norms which seem interesting, with the following criteria:

1. The Chinese and Swedish drivers could probably have significant differences in these pairs of norms.
2. The selected norms must be representative, thus they were selected to the greatest extent form varies aspects of society (e.g. family, workplace, education…).

Considering the time consuming of answering this questionnaire, it was not possible to select as many norms. Only 3 pairs of norms in each dimension were selected to represent all the norms. Thus totally 15 pairs were selected. The second step was to create some new norms, which reveal drivers` behaviours. The criteria are in the following:

1. For each general culture pair of norm, a probably correlated new pair of norm was created, on the traffic aspect. In the same way, a probably correlated new pair of norm on the in-car system was created.
2. The Chinese and Swedish drivers could probably have significant differences in these pairs of new norms.

At this stage, in one dimension, there were 3 pairs of norms on general culture, along with the corresponding 3 pairs of norms on traffic, and 3 pairs of norms on in-car system. Thus totally 45 pairs of norms were selected or created. Then a two-value inventory is formed up (see Appendix). However, as an exploratory experiment, the correlation between these pairs of norms had to be validated statistically. In practise, participants would be asked which norm he/she is prefer, in each pair of norms. Statistic analysis would show the percentage of preference between different groups of people. If the ideas of the norms on traffic or in-car system differ large between Chinese and Swedish group, while the preference of the corresponding general culture norm is significantly different, the general culture norm would supposed to be the interior culture factors of the difference of driving behaviours. In this questionnaire, the order of this inventory is disarrange on purpose, and some pairs of norms are reversed, in order to prevent these questions “guide” the participants to give answers.

The next part is some questions about the background of the participant, like gender, age, education etc. This is useful for the future in-depth analysis.

The video part is the last one, but not least. This is important because it is the most direct way to study on the two types of drivers. There are more than 100 hours video clips I got from supervisor. The recordings are from both Sweden and China. There is a challenge for me to select some of the clips for this study. They totally should not be too long, considering the time consuming to play the video to people. So first I filtered these videos, with these criteria:

1. Deleting the third-person perspective videos, and only first-person videos were retained, to simulate the driving situation from a driver`s perspective.

2. There are scenarios in both Sweden and China.

3. Considering that there is not much difference in the normal driving situation, some critical situations have to be selected to elicit the different driving behaviours. These situations should be within a large range, from not so critical to very critical.

5. The critical situations should be varied, e.g. car to car, car to pedestrian, car to bicycle. And it`s even better to find the situation in which it is not clear whose fault is, leaving them for the participants to judge.

4. The road conditions have to be taken into consideration, and better to be varied, like in urban straight road, in the curve, intersection, roundabout, in the country road and so on.

After a thorough consideration, 11 videos have been selected. Each of them is not very long, about 20 seconds.

In these video clips, there are a lot of problems in these critical situations (e.g. car exceed speed limits, bicyclist violates traffic rules, infrastructure problems). But they are not directly asked within the questions, because what I concern is if the drivers really “realize” the problems, and how do they define if there is a problem. Thus, some of the questions were structured in an open way, letting them to explain anything they want. The other questions are made in a closed way. The same kit of questions is used for the 11 videos, in order to make comparison.

The cover page was then added, to make it more formal, by showing thanks, and claiming that these answers will be anonymous and treated in the strictest confidence. This is very important to ensure that participants take it seriously to the greatest extent.

While in the design process, the questionnaire was reviewed by several people with experience in HCI design, with their feedback, the words were polished in a better way, which reduced the potential misunderstandings. All the words were chosen elaboratively, and in a very polite manner. However, sometimes there had to be a compromise between a detailed expression and a brief one. After completing the designing, a pilot test was carried out, which shows the questionnaire part takes about 15 minutes, and the video part takes about 45 minutes.

The questionnaire is designed in English originally, and this version would be used in Sweden. And we had translated it into a Chinese version, which would be used in China. The full English version of questionnaire and video part are illustrated in Appendix part.

3.2 Process in China

This study was firstly carried out in China, in July and August 2011. The video interviews were implemented in the city of Beijing and Chengdu, with 10 and 13 participants respectively. All of them had driving licenses and driving experience in China for more than 2 years. The age ranges from 23 to 55, and male female ratio is 60.9% to 39.1%. Two movie ticks were given to each participant as a reward. The video interviews were carried out one to one, with firstly the questionnaire part, and then the video part. These videos were played by a laptop.

For the questionnaire part, only a few samples were done by me, while most of the work was finished with the corporation of Tsinghua University in Beijing, which helped to spread the questionnaires out to drivers and collect them back. The operation fee for each case cost 35

RMB. Finally I collected 139 (including the questionnaires from the video participants) feedbacks, within which the age ranges from 22 to 60, with 64.7% male vs. 35.3% female.

3.3 Process in Sweden

The study proceeds in Sweden in September and October 2011. The video interviews were carried out in Gothenburg. Advertisements for recruiting participants were posted on bulletin boards in schools, markets, and residential districts. Meanwhile, some of the participants were invited by me or with the help of friends. All of them had driving licenses and driving experience in Sweden for more than 2 years. The age ranges from 19 to 55, and the male vs. female is 69.6% to 30.4%. Two movie tickets were given to each participant as a reward. The video interviews were carried out one to one, with firstly the questionnaire part, and then the video part. These videos were played by a laptop or iPad.

Except a few samples done by me, most of the questionnaires were spread out to drivers with the help of SAFER (Vehicle and Traffic Safety Center). Most of the work was done in the form of an online survey, which is created using Google Docs spread sheet. A 30kr IKEA gift card was delivered to the participants as a reward. Finally, 158 feedbacks were collected (including the questionnaires from the video participants). The age is from 19 to 68, with 65.8% male vs. 34.2% female.

4. Results

The collected data was inputted into computer and analyzed using the software SPSS 19. It is a very professional computer program used for survey authoring and deployment, data mining, text analytics, statistical analysis, and collaboration and deployment.

It is inevitable that some of the questions were ignored by some participants, and these missing values were not taken into statistic analysis. But they are quite few, comparing to the large amount of samples, so they do not have an effect on the global analysis.

4.1 The ADAS Using Attitude

For the first part, when asked about if there any ADAS in your car, 53.2% Chinese answered “Yes”, compared to only 25.9% Swedes. Among the people who have ADAS, Swedish drivers have a higher rate of installation in almost every system, except the Backup Monitor, of which there is an overwhelming installation rate (94.6%) in Chinese drivers, than that in Swedish drivers (46.2%). This is interesting that Chinese drivers seem much more like to have this system.

Generally, Swedish drivers have more knowledge about these systems. All groups of drivers hold a positive view towards ADAS, yet the Swedish group has a bit of higher percentage.

4.2 Drivers Segmentation

In total, the ratios of the four types of drivers are illustrated.

Table 4.1 Driver Segmentation

	Cautious Drivers (Type 1)	Progressive Drivers (Type 2)	Reckless Drivers (Type 3)	Diligent Drivers (Type 4)

In all	17.3%	24.9%	6.9%	50.9%
Chinese	23.8%	17.2%	7.4%	51.6%
Swedish	12.3%	31.0%	6.5%	50.3%

The difference between Chinese and Swedish drivers was mainly on Cautious Drivers (23.8% vs. 12.3%), and Progressive Drivers (17.2% vs. 31.0%).

In the part, I want to analyze the difference among the four types of drivers with the following questions about driving behaviors (from A.12 to A.16), the frequency on different types of roads (from A.17 to A.20), and driving attitude (from A.21 to A.25), which are scaled from 1 to 5. Another analysis is about the personalities (from A.26 to A.35), scaled from 1 to 7. The one-way ANOVA (one-way analysis of variance) technique was used to test for differences among the four groups. It is a technique used to compare means of two or more samples (using the F distribution). In this study, all the significance level (alpha value) is in default of 0.05. If the p value is less than or equal to the significance level, it implies all the means are equal. If the p value is greater than the significance level, there is insufficient evidence to claim that some of the means may be different from each other.

The test results are illustrated in the following:

Table 4.2 12. I enjoy driving:

	Mean	Std. Deviation
Cautious Drivers	2.46	.824
Progressive Drivers	4.14	.791
Reckless Drivers	4.47	.772
Diligent Drivers	3.70	.845

Table 4.3 12. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers			Sig. difference	
Reckless Drivers				Sig. difference
Diligent Drivers				

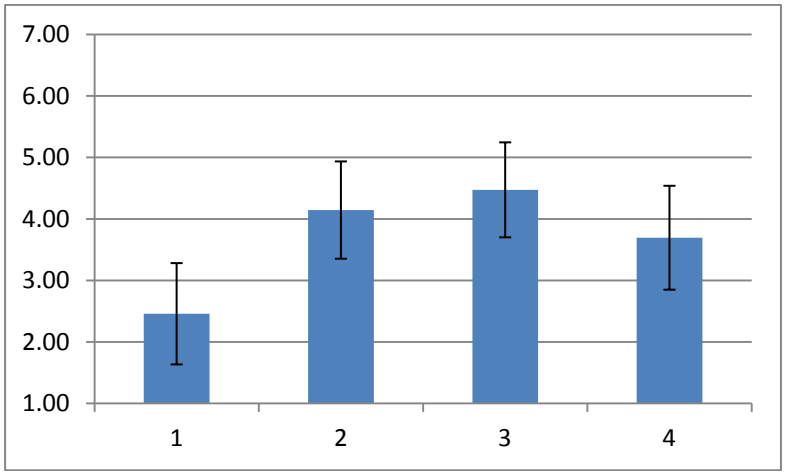

Figure 4.2 The mean and standard deviation of the four types of drivers in question 12.

Table 4.4 13. Compared with the average driver my driving is:

	Mean	Std. Deviation

Cautious Drivers	2.77	.857
Progressive Drivers	3.84	.779
Reckless Drivers	3.53	1.073
Diligent Drivers	3.38	.722

Table 4.5 13. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				Sig. difference
Reckless Drivers				
Diligent Drivers				

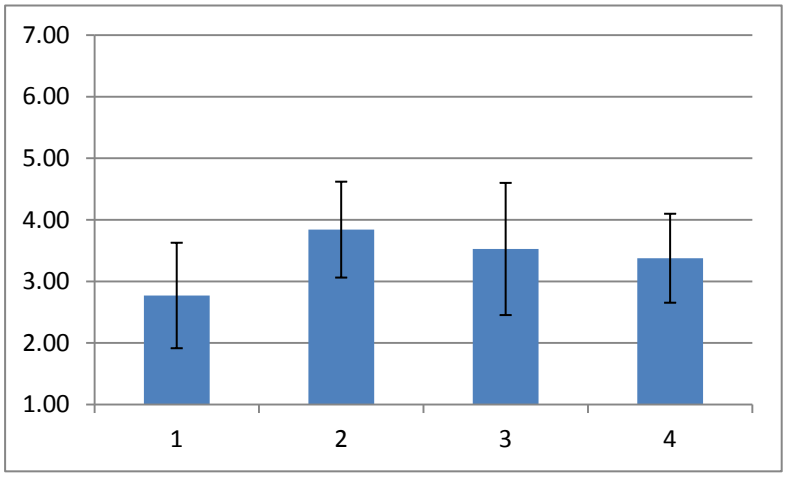

Figure 4.2 The mean and standard deviation of the four types of drivers in question 13.

Table 4.6 14. Compared with the average driver my driving speed is generally:

	Mean	Std. Deviation
Cautious Drivers	2.60	.676
Progressive Drivers	3.75	.497
Reckless Drivers	4.00	.577
Diligent Drivers	3.03	.599

Table 4.7 14. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				Sig. difference
Reckless Drivers				Sig. difference
Diligent Drivers				

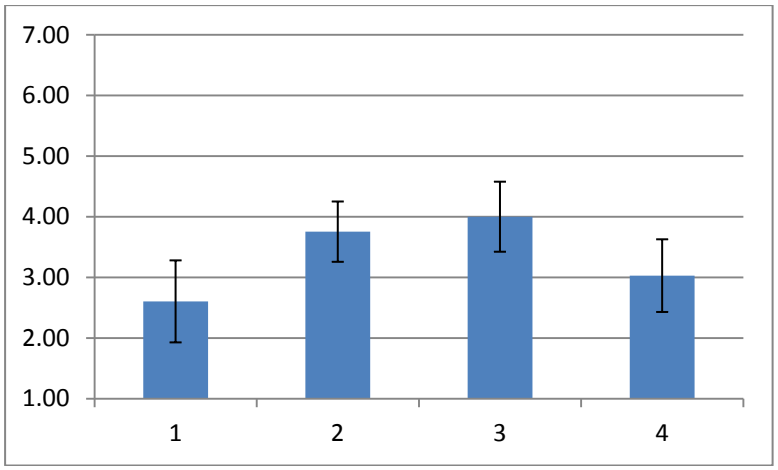

Figure 4.3 The mean and standard deviation of the four types of drivers in question 14.

Table 4.8 15. I feel nervous when driving:

	Mean	Std. Deviation
Cautious Drivers	2.71	1.031
Progressive Drivers	1.70	.960
Reckless Drivers	2.11	1.410
Diligent Drivers	2.10	1.044

Table 4.9 15. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference		Sig. difference
Progressive Drivers				Sig. difference
Reckless Drivers				
Diligent Drivers				

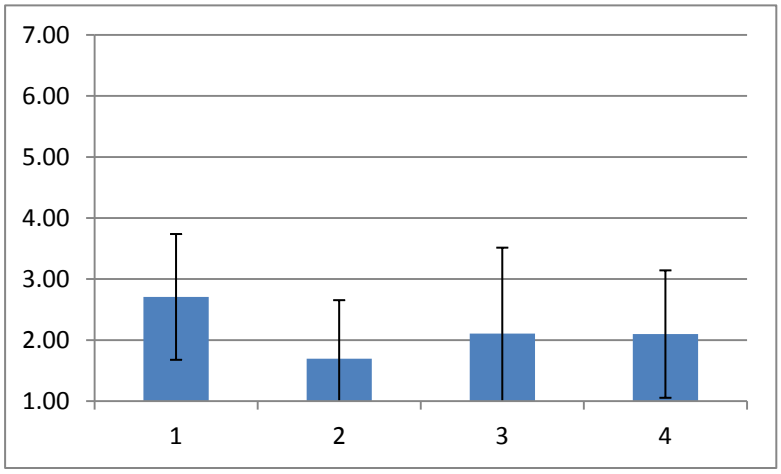

Figure 4.4 The mean and standard deviation of the four types of drivers in question 15.

Table 4.10 16. I am interested in cars:

.	Mean	Std. Deviation
Cautious Drivers	2.58	.895
Progressive Drivers	3.54	1.183
Reckless Drivers	3.74	1.195
Diligent Drivers	3.24	.955

Table 4.11 16.Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				
Reckless Drivers				
Diligent Drivers				

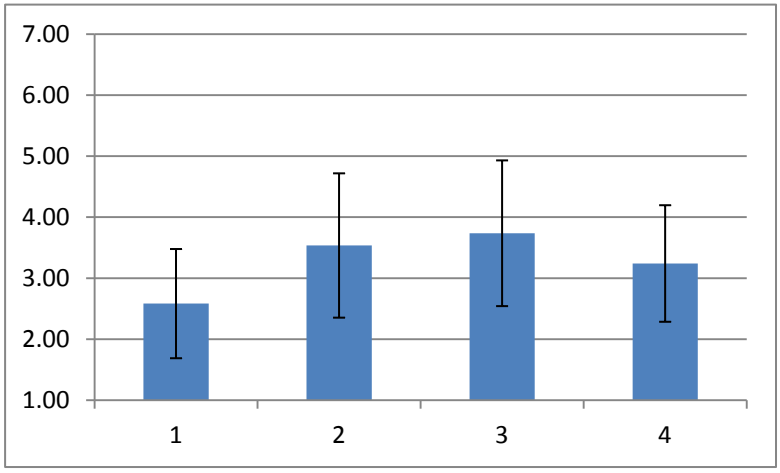

Figure 4.5 The mean and standard deviation of the four types of drivers in question 16.

Table 4.12 17. I drive on motorways:

	Mean	Std. Deviation
Cautious Drivers	2.38	.959
Progressive Drivers	4.04	.946
Reckless Drivers	3.74	1.240
Diligent Drivers	3.26	1.073

Table 4.13 17. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				Sig. difference
Reckless Drivers				
Diligent Drivers				

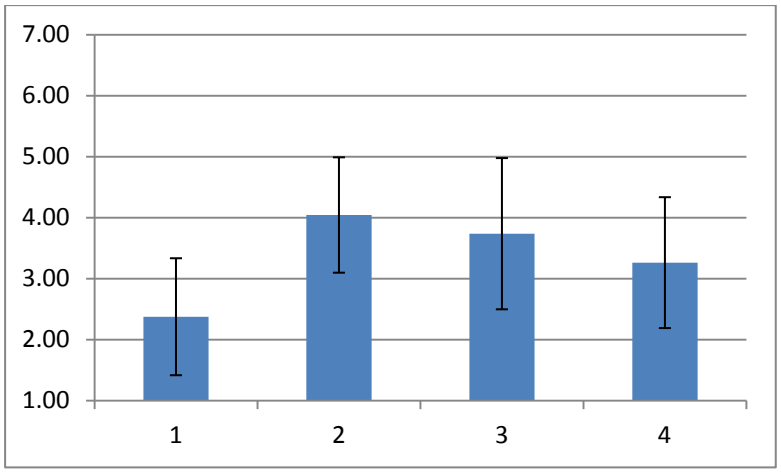

Figure 4.6 The mean and standard deviation of the four types of drivers in question 17.

Table 4.14 18. I drive on major roads:

	Mean	Std. Deviation
Cautious Drivers	2.73	1.169
Progressive Drivers	4.34	.957
Reckless Drivers	3.88	1.219
Diligent Drivers	3.62	1.116

Table 4.15 18. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				Sig. difference
Reckless Drivers				
Diligent Drivers				

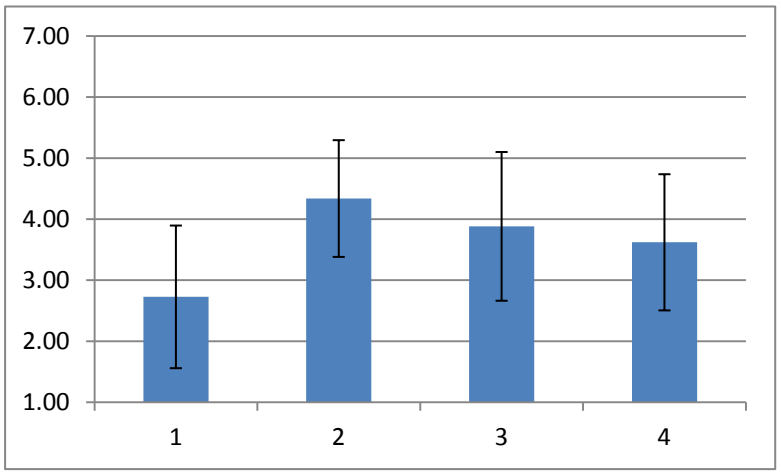

Figure 4.7 The mean and standard deviation of the four types of drivers in question 18.

Table 4.16 19. I drive on country (rural) roads:

	Mean	Std. Deviation
Cautious Drivers	2.44	.943
Progressive Drivers	3.48	1.133
Reckless Drivers	3.53	1.349

Diligent Drivers	3.13	1.206

Table 4.17 19. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				
Reckless Drivers				
Diligent Drivers				

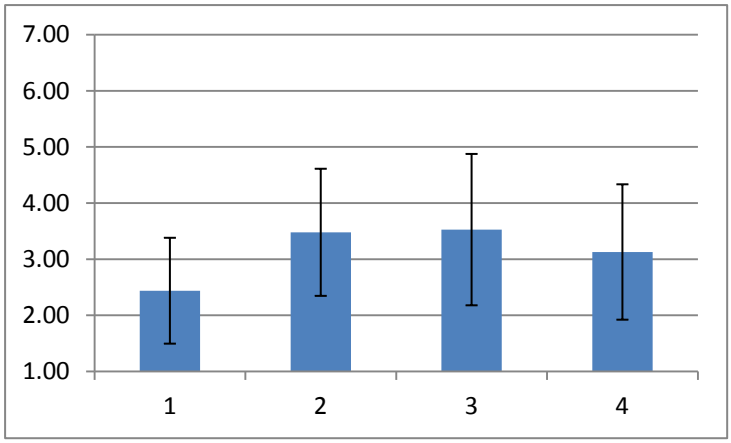

Figure 4.8 The mean and standard deviation of the four types of drivers in question 19.

Table 4.18 20. I drive in urban areas:

	Mean	Std. Deviation
Cautious Drivers	3.38	1.214
Progressive Drivers	4.55	.850
Reckless Drivers	4.47	.841
Diligent Drivers	4.18	1.066

Table 4.19 20. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	Sig. difference
Progressive Drivers				Sig. difference
Reckless Drivers				
Diligent Drivers				

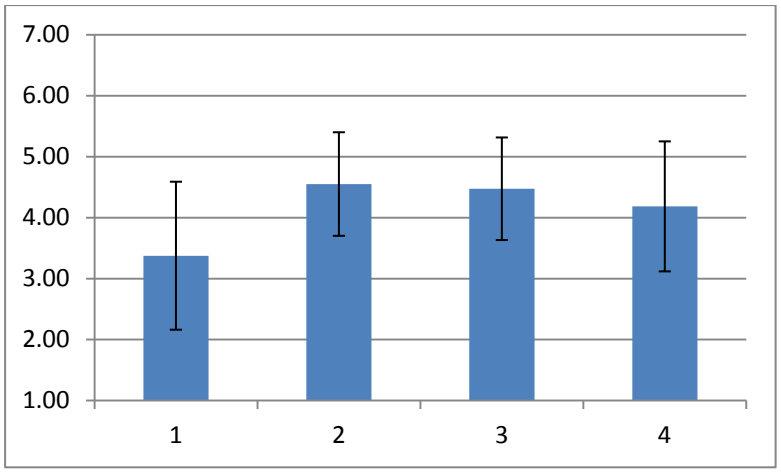

Figure 4.9 The mean and standard deviation of the four types of drivers in question 20.

Table 4.20 21. I get irritated when driving (e.g. with delays, others poor driving)

	Mean	Std. Deviation
Cautious Drivers	2.56	.987
Progressive Drivers	2.97	.727
Reckless Drivers	3.26	.872
Diligent Drivers	2.60	.784

Table 4.21 21. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers			Sig. difference	
Progressive Drivers				Sig. difference
Reckless Drivers				Sig. difference
Diligent Drivers				

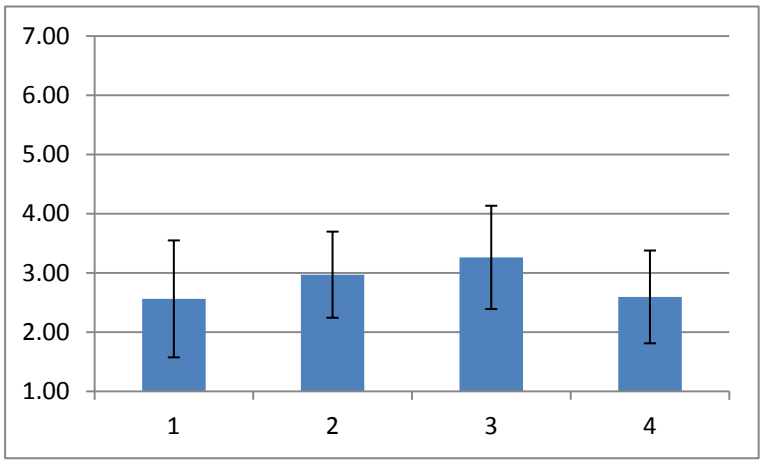

Figure 4.30 The mean and standard deviation of the four types of drivers in question 21.

Table 4.22 22. I rebuke others for their poor driving (e.g. by sounding the horn or flashing the lights)

	Mean	Std. Deviation
Cautious Drivers	2.29	1.051
Progressive Drivers	2.45	.814
Reckless Drivers	3.11	1.243

Diligent Drivers	2.23	.915

Table 4.23 22. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers			Sig. difference	
Progressive Drivers			Sig. difference	
Reckless Drivers				Sig. difference
Diligent Drivers				

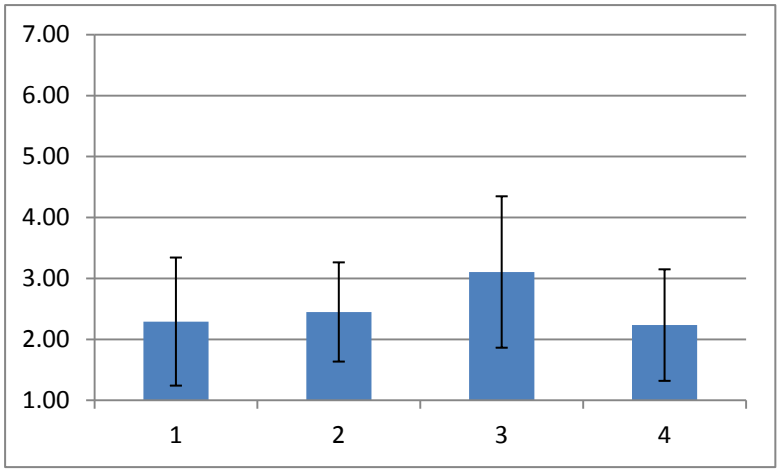

Figure 4.41 The mean and standard deviation of the four types of drivers in question 22.

Table 4.24 23. I drive in excess of the speed limit

	Mean	Std. Deviation
Cautious Drivers	2.25	.957
Progressive Drivers	3.39	.647
Reckless Drivers	3.58	.692
Diligent Drivers	2.58	.771

Table 4.25 23. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	
Progressive Drivers				Sig. difference
Reckless Drivers				Sig. difference
Diligent Drivers				

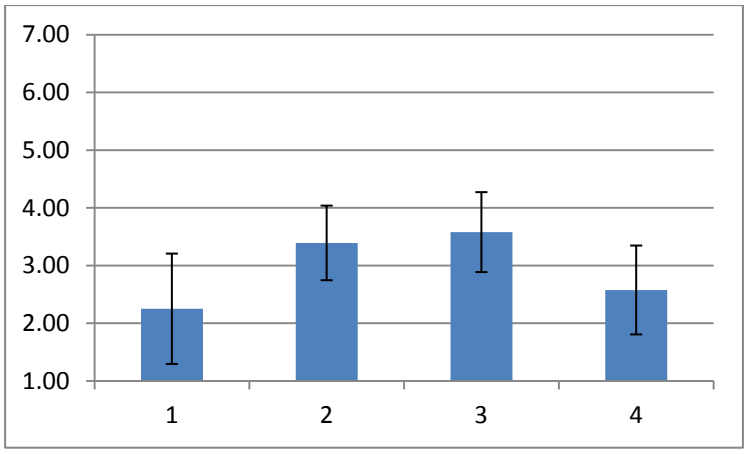

Figure 4.52 The mean and standard deviation of the four types of drivers in question 23.

Table 4.26 24. I drive after consuming alcohol

	Mean	Std. Deviation
Cautious Drivers	1.06	.320
Progressive Drivers	1.14	.430
Reckless Drivers	1.37	.684
Diligent Drivers	1.11	.372

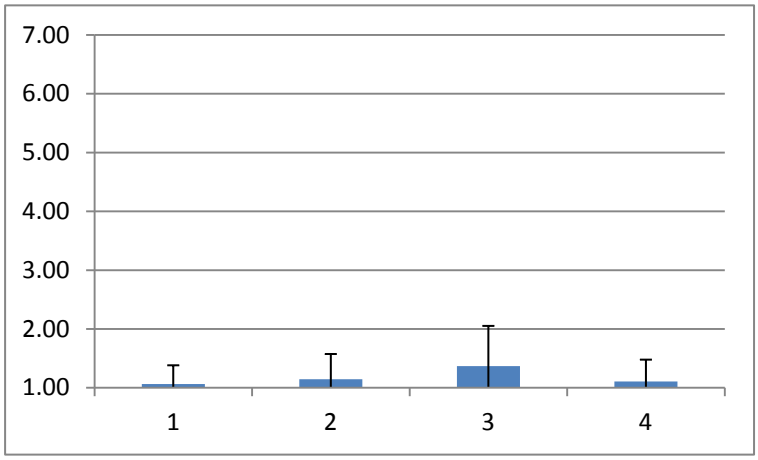

Figure 4.63 The mean and standard deviation of the four types of drivers in question 24.

Table 4.27 25. I drive when I am tired

	Mean	Std. Deviation
Cautious Drivers	2.00	.899
Progressive Drivers	2.42	.736
Reckless Drivers	2.84	.958
Diligent Drivers	2.20	.839

Table 4.28 25. Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference	Sig. difference	
Progressive Drivers				
Reckless Drivers				Sig. difference
Diligent Drivers				

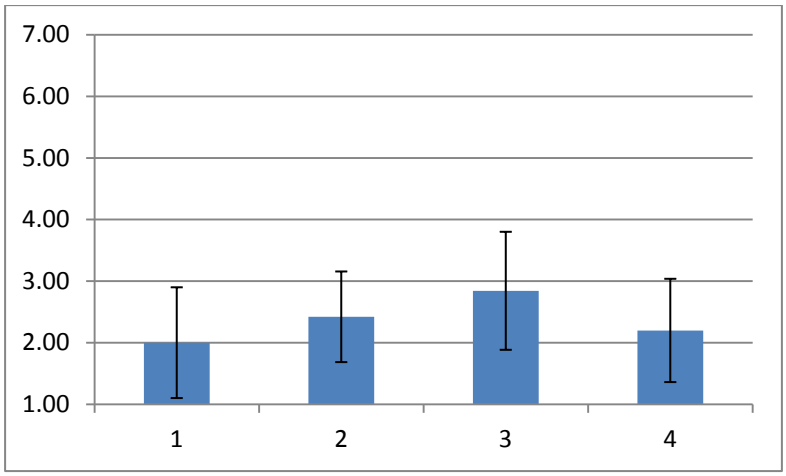

Figure 4.74 The mean and standard deviation of the four types of drivers in question 25.

The next 10 questions are TIPI, which is the tool kit of 10-item measure of the Big-Five personality dimensions, as mentioned in chapter 2.5.1. Before making the analysis, I converted the TIPI scores into the Big-Five dimensions, using a special algorithm [29]. Each dimension is scaled from 1 to 7, the same as TIPI.

Table 4.29 Extraversion:

	Mean	Std. Deviation
Cautious Drivers	4.114	1.1756
Progressive Drivers	5.023	1.3182
Reckless Drivers	4.882	1.0082
Diligent Drivers	4.348	1.2340

Table 4.30 Extraversion Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference		
Progressive Drivers				Sig. difference
Reckless Drivers				
Diligent Drivers				

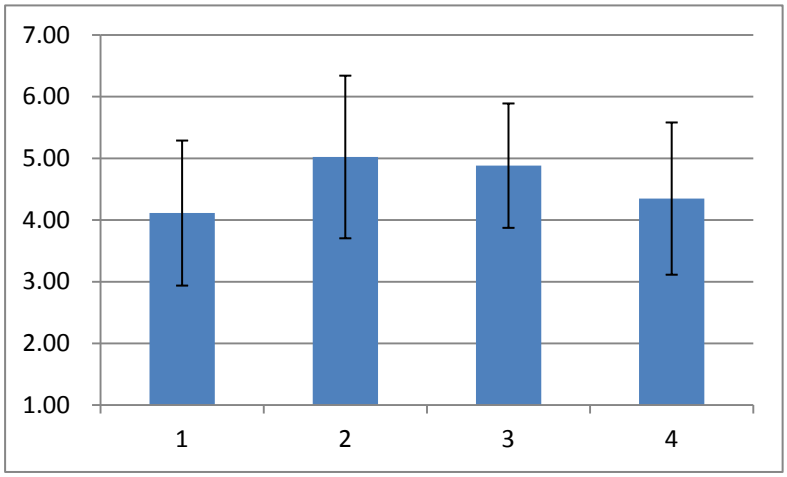

Figure 4.85 The mean and standard deviation of the four types of drivers in Extraversion.

Table 4.31 Agreeableness:

	Mean	Std. Deviation
Cautious Drivers	3.205	1.0305
Progressive Drivers	3.208	.9917
Reckless Drivers	3.441	.6094
Diligent Drivers	3.144	1.0067

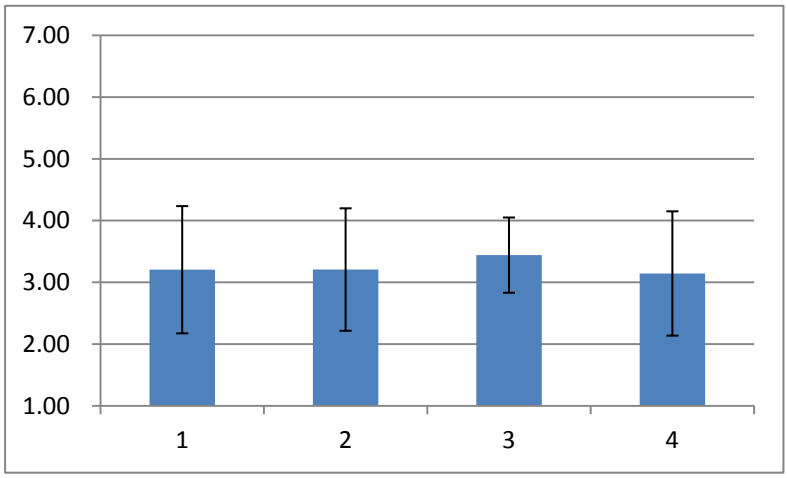

Figure 4.96 The mean and standard deviation of the four types of drivers in Agreeableness.

Table 4.32 Conscientiousness:

	Mean	Std. Deviation
Cautious Drivers	5.193	.8708
Progressive Drivers	5.538	.9113
Reckless Drivers	4.824	1.2617
Diligent Drivers	5.588	.9125

Table 4.33 Conscientiousness Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers				
Progressive Drivers			Sig. difference	
Reckless Drivers				Sig. difference
Diligent Drivers				

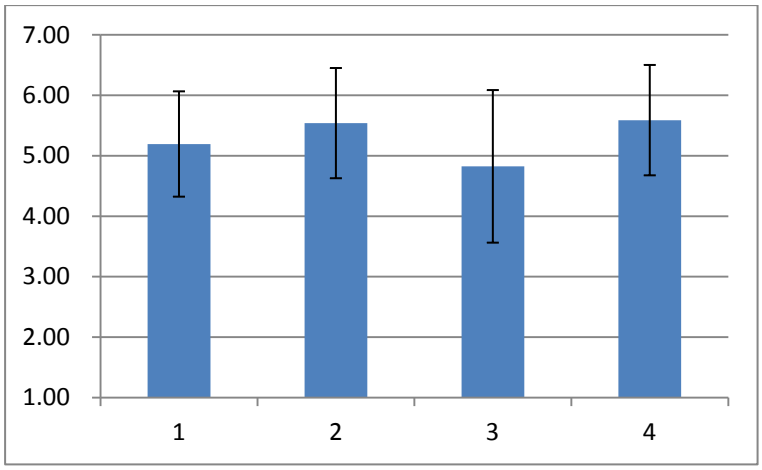

Figure 4.107 The mean and standard deviation of the four types of drivers in Conscientiousness.

Table 4.34 Emotional Stability:

	Mean	Std. Deviation
Cautious Drivers	3.591	1.3131
Progressive Drivers	2.677	1.1195
Reckless Drivers	3.412	1.7251
Diligent Drivers	2.973	1.2268

Table 4.35 Emotional Stability Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference		Sig. difference
Progressive Drivers				
Reckless Drivers				
Diligent Drivers				

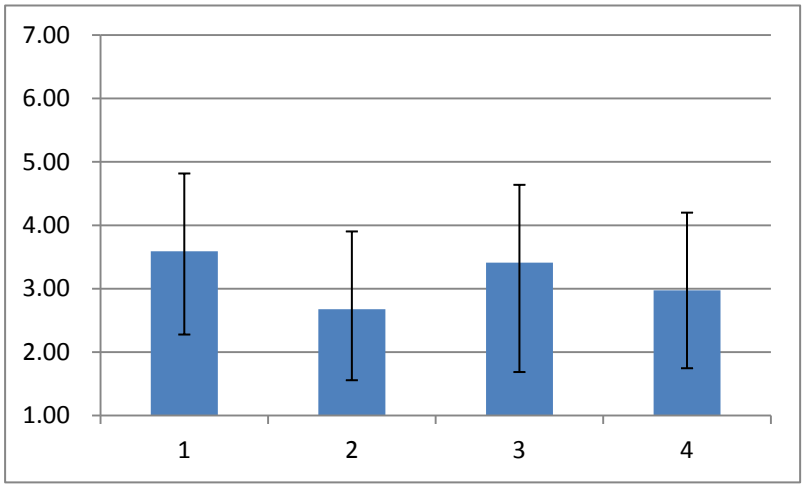

Figure 4.118 The mean and standard deviation of the four types of drivers in Emotional Stability.

Table 4.36 Openness:

	Mean	Std. Deviation
Cautious Drivers	4.852	.9799
Progressive Drivers	5.523	.9204
Reckless Drivers	5.265	1.1197

Diligent Drivers	5.246	1.0029

Table 4.37 Openness Result of post-hoc test:

	Cautious Drivers	Progressive Drivers	Reckless Drivers	Diligent Drivers
Cautious Drivers		Sig. difference		
Progressive Drivers				
Reckless Drivers				
Diligent Drivers				

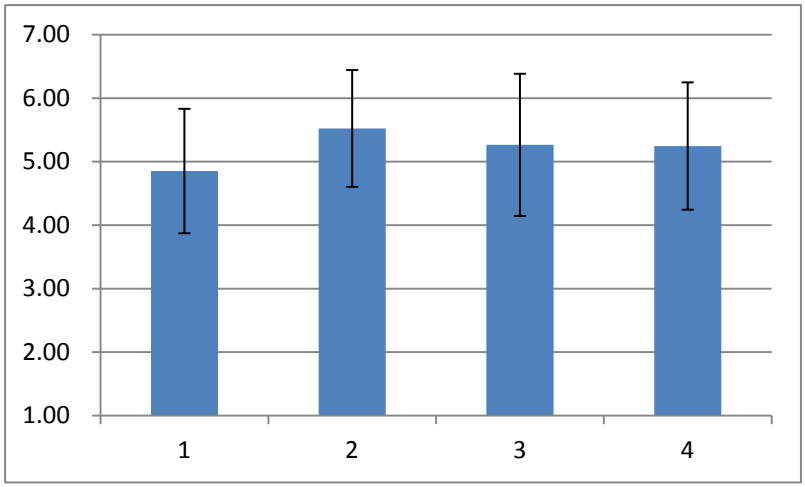

Figure 4.129 The mean and standard deviation of the four types of drivers in Openness.

In the next step, the characters of each type of drivers were summarized as in the following:

4.2.1 Cautious Drivers

Many in this segment dislike driving and will only do it if they have to. Safety is the top priority and some may drive rather slowly. Sometimes their over-caution can lead to danger.

The drivers in this segment have a cautious attitude towards driving, in some cases to the point of being nervous, because driving can be stressful for them they take little pleasure in it and find it to be of little or no interest, they have less confident about their driving skills and keep lowest speed. Their emotion is more stable than others.

4.2.2 Progressive Drivers

The people in this segment also like to drive fast but this is tempered with a concern for safety. Most of them are highly skilled drivers.

This segment enjoys speed. They have confidence in their decision making and driving ability, sometimes still driving when getting tired. They are more likely to get irritated with others. They drive on major road most, and sometimes excess of speed limit. They are very extravert.

4.2.3 Reckless Drivers

This segment loves speed and gives little thought to safety. Their characteristics are as follows.

They enjoy speed and sometimes show off to others by driving fast, they are very likely to get irritated and rebuke with others. Sometimes they can be dangerous as a result of exceeding of speed limit or tired driving. They are very extravert, and less conscientious.

4.2.4 Diligent Drivers

This group puts safety first and also do their best to comply with traffic laws. This doesn't necessarily mean they drive slowly – many in the segment will drive up to the speed limit. However it is safety rather than speed that is the first priority.

However, there are not so many characteristics which can be concluded from this segmentation. The values are usually not so significantly different but rather temperate. This may probably due to the fact that the segmentation is not divided perfectly. It can be merged into other segmentation or modified using another better description.

4.3 Culture Factor Study on Driving Behaviors

In the part, I made a Chi-Square Test between the norms, in order to exam the hypothesis that the norms we have created on traffic and in-car system have a correlation with the corresponding general culture norms. The p-value of Pearson Chi-Square is used to examine if the norms are independent or related, and if related, a Phi Coefficient is used to measure the strength of the relationship. The degree of correlation is defined like this [30]:

1. High degree of correlation: When the correlation coefficient range is above .75, it is called high degree of correlation.
2. Moderate correlation: When the correlation coefficient range is between .50 to .75, it is called in moderate degree of correlation.
3. Low degree of correlation: When the correlation coefficient range is between .25 to .50, it is called low degree of correlation.
4. Absence of correlation: When the correlation coefficient is between. 0 to .25, it shows that there is no correlation.

However, the results come to be very disappointing, that for almost all of the tests, the p-values of Pearson Chi-Square come out to be large. That is to say, it is likely that the norms are indeed independent. For the rest a few tests of which the p-values are small, the Phi Coefficients are extremely low.

As there is not directly relationship in all cases, I tried to make an in-depth analysis to dig out as much information as possible. Then I sorted out some cases with extreme culture position. For example, there are 3 pairs of general culture norms in PD (Power Distance), and for each of the pairs, the norm indicates the small PD was encoded with the value -1, while the norm indicates the large PD was encoded with the value 1. Then the cases with a sum of -3 or 3 in PD (people choose all the low PD norms or all the high PD norms) were selected out. Then the Chi-Square Test was used to measure the two extreme culture groups with all other norms on traffic and in-car system. The same procedure was executed to the other four dimensions.

The results show that although many of the Phi Coefficients are in low degree, they are much higher than the previous test. After comparing all the results, it is obvious that the general culture norms in PD (Power Distance) and MF (Masculinity/Femininity), rather than the other three dimensions, have a stronger relationship with the norms on traffic and in-car system.

Above all, although the hypothesis H4 is not proved in all the cases, at least, the correlations are higher and acceptable within the extreme culture groups in PD and MF dimensions. Thus, some significant information could probably be found within these cases.

Then the Chi-Square Test was used among the PD extreme general culture cases, to measure the Chinese and Swedish groups with all the norms on traffic and in-car system. The Phi Coefficients in the following norms are significantly higher. That means in the PD extreme cases, the proportion of selection on the following PD norms are significant different between the Chinese and Swedish drivers:

A52: If I travel together with my boss, it doesn't matter who is the driver vs. If I travel together with my boss, I should be the driver (Phi= .664)

Meanwhile, the Chi-Square Test was used among the MF extreme general culture cases, to measure the Chinese and Swedish groups with all the norms on traffic and in-car system. The Phi Coefficients in the following norms are significantly higher. That means in the MF extreme cases, the proportion of selection on the following MF norms are significant different between the Chinese and Swedish drivers:

A59: In the case of a traffic conflict, men and women should be held equally responsible vs. In the case of a traffic conflict, men should take more responsibility than women (Phi= .558)
A72: I prefer an interface designed for both men and women vs. I prefer an interface that is customized for women or men (Phi= .502)
A74: The interaction between driver and in-car system should be designed so to allow a dialog between driver and the system vs. The interaction between driver and in-car system should be designed so the driver only give comments to control the system (Phi= .355)

To sum up, in the extreme cases, the different proportion between Chinese and Swedish drivers, in the selection of norm “A52: If I travel together with my boss, it doesn't matter who is the driver vs. If I travel together with my boss, I should be the driver”, is determined by the culture factor Power Distance. The different proportion between Chinese and Swedish drivers, in the selection of norm “A59: In the case of a traffic conflict, men and women should be held equally responsible vs. In the case of a traffic conflict, men should take more responsibility than women”, “A72: I prefer an interface designed for both men and women vs. I prefer an interface that is customized for women or men”, “A74: The interaction between driver and in-car system should be designed so to allow a dialog between driver and the system vs. The interaction between driver and in-car system should be designed so the driver only give comments to control the system”, are determined by the culture factor Masculine/Feminine.

4.4 Video Analysis

The answers on videos were analyzed using a subjective way, but not statistic analysis, because there are many open questions. Meanwhile, the frequency scales are compared between only two groups, which are also easy to distinguish. I made this analysis in the following steps:

1. For each video, list all the items of questions. For each item, categorize their answers and for each categorize, summarize the percentage of people who mentioned it. This is done in Chinese and Swedish groups separately.
2. For each item, compare the main aspects between the two groups of drivers, and summarize the common points and different aspects.

3. As all the questions for each video are the same, it is easy to compare every item of question, among the 11 videos. For example, for question 2, all the 11 results from step 2 were listed and compared.

4. Summarize the common points and main differences for each question, and form up the final results.

The results are list here:

1. It is obvious that Swedish drivers feel more stressful than Chinese drivers when meet these critical situations.
2. Swedish drivers are more focus on the traffic signs, including the marks on the road. Many of them claim that there is a lack of lane marks on the road.
3. A lot of Swedish drivers point out the problem of mixed traffic (cars, bicycles, pedestrians on the same road) in some scenario, while Chinese drivers are quite used to that, as not so many people point out that.
4. When asking about the frequency of seeing these scenarios, the Chinese group claims a higher frequency for all the critical situations, except for one video without critical situation.
5. Swedish drivers drive strictly following the lane, and are very cautious when changing lanes, in case of the rear-end accident; Chinese drivers have a higher frequency of changing lanes, in order to avoid the obstacles in front.
6. Chinese drivers are much more like to sound horn in these situations.
7. When asking about the drivers' needs in these critical situations, in both groups, a large percent of drivers mention that they need Brake Assist, many drivers point out they want the information of coming objects around the car. Moreover, drivers in both groups mention that there is a need of traffic lights and signs in the critical situations, while only Chinese drivers refer to the traffic policeman.

5. Discussion

Throughout this study, many differences on driving behaviors have been elicited and analyzed. However, the reliability of this study has to be considered.

The one-way ANOVA was used during the driver segmentation analysis. However, there are several kinds of post-hoc test need to be considered. The results may probably be affected by the test technique, although this effect would not be large. The Tukey`s HSD and Games-Howell techniques were selected for the test. Although the Tukey procedure was designed primarily for the case of equal sample sizes, the study of Robert [31] indicates that even under severe conditions of unequal group sizes, the test is robust. So to large extent, this test is reliable.

In this study, the sample size is large in both Sweden (158) and China (139), empirically, from some previous studies, this sample size is representative and enough to elicit the differences of driving behaviors between different culture groups. This is the advantage of using questionnaire, to get the information from a large amount of participants. However, the disadvantage is that we cannot ensure every participant taking it seriously. In fact, originally, the feedbacks are even more. But I decided to delete some of the questionnaires of which obviously the participants did not do it seriously, with a lot of answers missing, or unintelligible (10 pieces from China and 1 piece from Sweden). This is done to maintain the quality of the questionnaires to the greatest extent.

The video study is quite effective, and much information is elicited from this study. However, the information is more on drivers` cognition and attitude. There is not see many differences on the driving measures they will take as I expected. Most of them would say something like “I would not drive so fast” or “I will obey the traffic rules, and give ways” when watching the video clips. But I suppose that`s because they have already know the accidents or emergency situation at the end of the videos. If they do not know what will happen, they may probably take another strategy.

The interior culture norms of the different driving behaviors on traffic and in-car system were found, but with many constraints. Firstly, this correlation can only be found in the extreme culture cases, in which they have extreme large or small values. Secondly, these correlations are only on the two dimensions of Power Distance and Masculinity/Femininity, with a moderate Phi value, which means the correlation strength is not very high. Thirdly, the different driving behaviors between Chinese and Swedish groups, which can also be revealed by the interior culture factors, are quite few. And The Phi value is not high. That means it is not so effective to study the culture differences on driver behaviors. Something has to be modified. Some of the norms can be omitted, while some others have to be redesigned into a better way.

Another, all the culture factors questions are designed in a two-value way, which enforces participants to choose one from the pair of norms. This is easy and convenient for the participants, for they don`t have to think a lot, especially when the amount of questions is large, which makes participants easily get bored and tired. However, through this study, I feel that the two-value way will not be so effective. For example, the Swedish group may be at the extreme position of Femininity in selection of the driving behavior norms, while the Chinese group is in the middle but incline to Femininity. In this case, it seems like the two groups have the same preference, and the difference is hidden behind. However, instead of two-values, if a scale is used to measure the extent of their preference, it is easier to distinguish the two groups from the values. However, this method increases the complexity of the question. The amount of questions has to be reduced, or the time expectation for finishing the questionnaire has to be extended.

6. Conclusion

Although it is difficult to find the direct correlation between the interior culture factors and the norms on traffic and system, the main two culture dimensions in which the differences on traffic and in-car system norms are more significant were defined. Within some constraints, a few norms on traffic or in-car system norms are different and can be revealed by the interior general culture norms. It is more like an explorer study, since there is no previous study can be found in the related area. It suggested that the largest difference between Chinese and Swedes exists in Power Distance and Masculine/Femininity. If there is a more in-depth study on the two dimensions, with modifying some of the norms, much more differences on driving behaviors could probably be found.

This study shows that there in China, the ADAS installation rate is double than that in Sweden. This data looks surprising, and it is inconsistent with the hypothesis. This is because originally, I thought the ADAS was developed in the western countries first, and came into Chinese market late, so there should be more installation in Sweden. The fact may be due to these reasons:

1. The ADAS we studied on did not include ABS (Anti-locked Braking System) and TCS (Traction Control System).
2. In recent years, the sales volume of cars in China has a sharp increasing, while in Sweden, much more people prefer to buy a second-hand car, rather a new, advanced-equipped car.
3. Some of the Swedish drivers may not know if they have these systems or not, as they are not interesting in these new things.

There is a significant difference between Swedish and Chinese drivers` and acceptance and preference in ADAS. The installation rate of Backup Monitor in China is overwhelming than that in Sweden. This is interesting that Chinese drivers seem much more like to have this system. It is probably due to the reason that in China, most of the drivers are the first-generation drivers, who may not have a long time of driving experience, and not confident about their driving skills when driving backwards. Moreover, the parking fields in China are in varies conditions, and sometimes can be very crowd. So many of them can not live without the system.

The driving behaviors are obviously different among the 4 types of drivers, and the percentage of reckless drivers and diligent drivers is almost in Sweden and China, but there is a higher proportion of cautious drivers and lower proportion of progressive drivers in China than that in Sweden. The cautious drivers have a cautious attitude towards driving, in some cases to the point of being nervous, because driving can be stressful for them they take little pleasure in it and find it to be of little or no interest, they have less confident about their driving skills and keep lowest speed. Their emotion is more stable than others. The Progressive Drivers enjoy speed. They have confidence in their decision making and driving ability, sometimes still driving when getting tired. They are more likely to get irritated with others. They drive on major road most, and sometimes excess of speed limit. They are very extravert. The reckless drivers enjoy speed and sometimes show off to others by driving fast, they are very likely to get irritated and rebuke with others. Sometimes they can be dangerous as a result of exceeding of speed limit or tired driving. They are very extravert, and less conscientious. The diligent drivers do not have many characteristics, the temperate values indicate that this segmentation is still need to be improved. However, to a large extent, this study statistically validated P.W. Jordan`s [27] research of drivers segmentation, with many obvious characteristics been summarized for each segmentation.

The video study turns out to be a very effective and economy method. Several differences in driving behaviors, attitudes, and cognition between Swedish and Chinese drivers are identified in the video study using simulated real scenarios. The traffic conditions are different between China and Sweden. Since driving behaviour is highly environmentally and culturally mediated, the ADAS which work all right in Sweden may be not good in China. Meanwhile, the preference of ADAS also varies between the two driver groups. This requires that system designers must have a better understanding on Chinese drivers` characters, as well as the environment in China. They must consider that the functions or settings of ADAS in a country where the traffic situation is regulated have to be adjusted to adapt to another country with many traffic issues. For instance, the system warnings may be triggered many more times in China than that Sweden, due to the chaos of traffic situation. However, the driver may feel quite annoyed and shut down the system.

7. Future Work

The main goal of this study is to compare the driving behaviors between different culture groups, but the drivers` backgrounds information was collected as well. According to Factor and Mahalel [31], there is evidence of driving-culture differences within countries among sub-groups according to gender, age, education, ethnicity, and socioeconomic status. In the future, much more information can be found out by comparing groups divided by other dimensions. Some sub-culture differences may be studied as well.

Another, this questionnaire can be redesigned in a better way. For example, as mentioned above, the two-value inventory can be replaced by scales. And in the future, it is enough to study on only two dimensions, the Power Distance and the Masculinity/Femininity. Our purpose is to design a kit of questionnaire to investigate the culture difference, and understand the interior reason of the difference. But as we all know, a mature questionnaire is not as easy to design, and several iteration of tests and modifies have to be made to achieve this goal.

Furthermore, some more HCI methods can be considered and used in this study, to elicit different aspects of information. For example, Focus Group Study, Observation and so on. Meanwhile, the culture-difference study can also be carried out along with other studies, as an ethical issue. This is a low-cost way of making the study, since the methods and process of the study all exist, and what only need to reconsider is recruiting different groups of participants.

8. References

[1]杨絮, "主动安全产品的全球市场," *世界汽车*, pp.30-31, Sep. 2008.
[2]A. Lindgren, F. Chen, P.W. Jordan, and H. Zhang, "Requirements for the design of advanced driver assistance systems – the differences between Swedish and Chinese drivers," *International Journal of Design*, vol. 2, no. 2, pp. 41-54, Aug. 2008.
[3]A. Lindgren, F. Chen, P.W. Jordan, and P. Ljungstrand, "Do you need assistance? – naturalistic case studies investigating the need of advanced driver assistance systems during normal driving,", unpublished, Chalmers University of Technology, Sweden, 2007.
[4]A. Lindgren, R. Broström, F. Chen, and P. Bengtsson, "Driver attitudes towards advanced driver assistance system – cultural differences and similarities," in *Human Factors Issues in Complex System Performance*, D. de Waard, G.R.J. Hockey, P. Nickel, and K.A. Brookhuis, Ed. Maastricht, the Netherlands: Shaker Publishing, 2007, pp. 205-215.
[5]C. Xie and D. Parker, "A social psychological approach to driving violations in two Chinese cities," *Transportation Research Part F*, vol. 5, pp. 293-308, Jun. 2002.
[6]占强, "关注道路安全-第一届中国道路交通安全论坛," *世界汽车*, pp. 26-27, May. 2007.
[7]占强, "探讨我国道路安全现状-记第二节中国道路安全主题论坛," *世界汽车*, pp. 18-19, Jun. 2008.
[8]Y.H. Huang, W. Zhang, M. Roetting, and D. Melton, "Experiences from dual-country drivers: driving safely in China and the US," *Safety Science*, vol. 44, pp. 785-795, May 2006.
[9]A. Lindgren, F. Chen, P.W. Jordan, and P. Ljungstrand, "Cross-cultural issues and driver requirements for advanced driver assistance systems," in proceedings of the 2nd International Conference on Applied Human Factors and Ergonomics, Las Vegas, US, 2008.

[10] J.D. Lee, "Driving safety," In *Review of Human Factors*, R. S. Nickerson, Ed. Santa Monica, CA: Human Factors and Ergonomics Society, pp. 172-218, 2006.
[11]A. Lindgren, F. Chen, "State of the art analysis: an overview of advanced driver assistance systems (ADAS) and possible human factors issues," Swedish Network for Human Factors Conference, Linköping, Sweden , 2006.
[12]J.F. Coughlin, B. Reimer, and B. Mehler, "Driver Wellness, Safety & the Development of an AwareCar", 2009, http://agelab.mit.edu/system/files/file/Driver_Wellness.pdf.
[13]T. Rothengatter, H. Alm, M.J. Kuiken, J.A. Michon, W.B. Verwey, "The driver," in *Generic Intelligent Driver Support*, a comprehensive report on GIDS, J.A. Michon, Ed. London and Washington DC: Taylor and Francis, pp. 33-52, 1993.
[14]S. Joshi, T. Bellet, V. Bodard, and A. Amditis, "Perceptions of risk and control: understanding acceptance of advanced driver assistance systems", in proceeding INTERACT 2009, pp. 524-527, 2009.
[15]N. Dragutinovic, K.A. Brookhuis, M.P. Hagenzieker, and V.A.W.J Marchau, "Behavioural effects of advanced cruise control use - a metaanalytic approach," *EJTIR*, vol. 5, no. 4, pp. 267-280, 2005.
[16]E. Hollnagel, "A function-centred approach to joint driver-vehicle system design," *Cogn Tech Work*, vol. 8, pp. 169-173, 2006.
[17]R. Heimgärtner, "Towards cultural adaptability in driver information and – assistance systems", in *Usability and Internationalization*, N. Aykin, Ed. Heidelberg Berlin: Springer – Verlag, pp. 372-381, 2007.
[18]W. Zhang, Y.H. Huang, M. Roetting, Y. Wang, H. Wei, "Driver`s view and behaviors about safety in China – what do they not know about driving?" *Accident Analysis & Prevention*, vol. 38, pp. 22-27, 2006.
[19]B. van Waterschoot, and M. van der Voort, "Implementing human factors within the design process of advanced driver assistance systems (ADAS)," in *Engin. Psychol. and Cog. Ergonomics*, D. Harris, Ed. Heidelberg, Berlin: Springer – Verlag, pp. 461-470, 2009.
[20]A. Lindgren, F. Chen, P. Amdahl, and P. Chaikiat, "Using personas and scenarios as an interface design tool for advanced driver assistance systems," in *Universal Access in Human-Computer Interaction: Ambient Interaction*, C. Stephanidis, Ed. Heidelberg Berlin: Springer – Verlag, pp. 460-469, 2007.
[21]P. Jenny, R. Yvonne, and S. Helen, *Interaction Design: Beyond Human-ComputerIinteraction*. New York, John Wiley & Sons Inc, 2002.
[22]Wikipedia, "Questionnaire," 2011, Internet: http://en.wikipedia.org/wiki/Questionnaire.
[23]S. D. Gosling, P. J. Rentfrow, and W. B. Swann Jr, "A very brief measure of the Big-Five personality domains", *Research in Personality*, vol. 37, pp.504-528, 2003.
[24] P.T. Costa, R.R. McCrae, (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
[25]G. Hofstede, G.J. Hofstede, M. Minkov, *Cultures and Organizations: Software for the Mind*. New York: McGraw-Hill, pp.29-32, 2010.
[26]V. Gouveia, M Ros, "Hofstede and Schwartz's models for classifying individualism at the cultural level: their relation to macro-social and macro-economic variables", *Psicothema*, vol.12, Supl., pp. 25-33, 2000.
[27]P.W. Jordan, F. Chen, and A. Lindgren, "Drivers and driving: a segmentation based on behaviours and attitudes", unpublished, Chalmers University of Technology, Sweden, 2007.
[28] "Cultural Dimensions and Global Web Design: What? So What? Now What?", [Online]. Available:
http://www.amanda.com/cms/uploads/media/AMA_CulturalDimensionsGlobalWebDesign.pdf

[29]“Ten Item Personality Measure (TIPI)”, [Online]. Available: http://homepage.psy.utexas.edu/homepage/faculty/gosling/scales_we.htm
[30]“Correlation in SPSS”, [Online]. Available: http://spss-help.blogspot.com/2009/03/correlation-in-spss.html
[31]R. Factor, D. Mahalel, and G Yair, “The social accident: A theoretical model and a research agenda for studying the influence of social and cultural characteristics on motor vehicle accicents”, *Accident Analysis and Prevention*, vol. 39, pp. 914-921, 2007.

Appendix

The 5-dimension inventory of norms on general culture, traffic, and in-car system

PD ① General *Small*	I think inequalities among people should be minimized (e.g. manual work has the same status as office work)		**PD** ① General *Large*	I think inequalities among people are expected and desired (e.g. white-collar jobs are valued more than blue-collar jobs)
PD ① Traffic *Small*	If a luxury car drive behind me and force me to give way, I would **not do** it just because it was a luxury car		**PD** ① Traffic *Large*	If a luxury car drive behind me and force me to give way, I would **do** it just because it was a luxury car
PD ① System *Small*	In-car systems should be installed based only on my **drive needs**		**PD** ① System *Large*	It is very important that in-car systems should be installed in order to reflect my **social status**
PD ② General *Small*	I think children should treat parents and older relatives as **equals**		**PD** ② General *Large*	I think that children **respect** for parents and older relatives is a basic and lifelong virtue
PD ② Traffic *Small*	If I travel together with my boss, it doesn't matter who is the driver		**PD** ② Traffic *Large*	If I travel together with my boss, I should be the driver
PD ② System *Small*	If I and my parents travel together, I would consider **both my own needs** and my parents' needs for the in-car system when we took rental car		**PD** ② System *Large*	If I and my parents travel together, I would respect **more of my parents' needs** for the in-car system when we took rental car.
PD ③ General *Small*	I think managers should rely on their own experience and on subordinates at work		**PD** ③ General *Large*	I think managers should rely more on superiors and on formal rules at work
PD ③ Traffic *Small*	In complicated traffic situation, I prefer to have **traffic policeman** to lead the traffic, because it can be more flexible.		**PD** ③ Traffic *Large*	In complicated traffic situation, it is important that everybody follows the **traffic signals**
PD ③ System *Small*	I will read the menu only when I can not operate the in-car system		**PD** ③ System *Large*	I will read the menu before I use any new in-car system
I/C ① General *Collectivist*	I think that for maintaining harmony, it is not good to point out other`s fault		**I/C** ① General *Individualist*	I think that speaking one`s mind is a characteristic of an honest person
I/C ① Traffic *Collectivist*	When in traffic, I should cooperate with other road users		**I/C** ① Traffic *Individualist*	When in traffic, I care mostly about myself
I/C ① System *Collectivist*	The in-car system should provide **positive** feedback (e.g.. showing me when my driving is good)		**I/C** ① System *Individualist*	The in-car system should only provide **negative** feedback (e.g.. warn me when I make mistakes)
I/C ②	I prefer to show my sadness, but		**I/C** ②	I prefer to show my happiness, but

General *Collectivist*	not happiness to other people		General *Individualist*	not sadness to other people
I/C ② Traffic *Collectivist*	If my car breaks down on the road, I will ask **a friend** to help		**I/C** ② Traffic *Individualist*	If my car breaks down on the road, I will ask the **service center** to help
I/C ② System *Collectivist*	The system should be designed to show which functions are **not working**		**I/C** ② System *Individualist*	The system should be designed to show which functions are **working**
I/C ③ General *Collectivist*	I think **social network** is my primary source of information		**I/C** ③ General *Individualist*	I think **media** is my primary source of information
I/C ③ Traffic *Collectivist*	When planning my trip, I rely on information provided by **friends**		**I/C** ③ Traffic *Individualist*	When planning my trip, I rely on information from **public media**
I/C ③ System *Collectivist*	The in-car system should provide the functions that can easily access to my **social network** (e.g.. phone calls, SMS, private talks)		**I/C** ③ System *Individualist*	The in-car system should provide the functions for me to access the **public media** (e.g.. Radio, Internet research function, Google map)
M/F ① General *Feminine*	I think that international conflicts should be resolved by **negotiation and compromise**		**M/F** ① General *Masculinity*	I think that international conflicts should be resolved by a **show of strength or by fighting**
M/F ① Traffic *Feminine*	When I crash with another car, firstly I should be polite to the other person, and then analyze the factors together		**M/F** ① Traffic *Masculinity*	When I crash with another car, firstly I state my personal right, then prefer the third person or police to analyze
M/F ① System *Feminine*	The interaction between driver and in-car system should be designed so to allow a **dialog** between driver and the system		**M/F** ① System *Masculinity*	The interaction between driver and in-car system should be designed so the driver only give **comments** to control the system
M/F ② General *Feminine*	I think family relationships and quality of daily life are important		**M/F** ② General *Masculinity*	I think challenge, earnings, recognition, and advancement are important
M/F ② Traffic *Feminine*	When selecting a car, my priorities are **comfort and safety**		**M/F** ② Traffic *Masculinity*	When selecting a car, my priorities are **engine power and technical specifications**
M/F ② System *Feminine*	On interface, I concern more on **esthetic and user-friendliness**		**M/F** ② System *Masculinity*	On interface, I concern more on system transparency of **how technology works** in the car
M/F ③ General *Feminine*	I think that both men and women are almost alike		**M/F** ③ General *Masculinity*	I think that men are usually more likely to be responsible, decisive, ambitious; women are usually more likely to be care and gentle.
M/F ③ Traffic	In the case of a traffic conflict, men and women should be held equally		**M/F** ③ Traffic	In the case of a traffic conflict, men should take more responsibility

Feminine	responsible		*Masculinity*	than women
M/F ③ System *Feminine*	I prefer an interface designed for both men and women		**M/F** ③ System *Masculinity*	I prefer an interface that is customized for women or men
UA ① General *Weak*	I can understand that teacher may say "I don`t know"		**UA** ① General *Strong*	I think teachers are supposed to have all the answers
UA ① Traffic *Weak*	Traffic regulation can have some problem		**UA** ① Traffic *Strong*	Traffic regulation must be perfect
UA ① System *Weak*	I **can** accept that the in-car system gives wrong information occasionally		**UA** ① System *Strong*	I **can not** accept that in-car system gives wrong information
UA ② General *Weak*	I think there should be no more rules than strictly necessary		**UA** ② General *Strong*	I have an emotional need for rules, even if these will not work
UA ② Traffic *Weak*	In traffic conjunction, I prefer **roundabout**		**UA** ② Traffic *Strong*	In traffic conjunction, I prefer **traffic light**
UA ② System *Weak*	The in-car system should only provide me information when it is absolutely necessary		**UA** ② System *Strong*	The in-car system should provide me redundant information so to remind me any potential issues
UA ③ General *Weak*	I **quickly** adopt new products and technologies		**UA** ③ General *Strong*	I **take some time** before adopting products and technologies
UA ③ Traffic *Weak*	If there are several ways to go to a certain place, I always like to try **new** roads		**UA** ③ Traffic *Strong*	If there are several ways to go to a certain place, I choose the **same** road every time
UA ③ System *Weak*	I would like to adopt the **newest** in-car system		**UA** ③ System *Strong*	I prefer to use the in-car system I am **familiar** with
L/S ① General *Short*	I think a person`s ability to be **stable** is more important		**L/S** ① General *Long*	I think a person`s ability to be **adaptable** is more important
L/S ① Traffic *Short*	Before going on vacation, I usually make a very **detailed** plan		**L/S** ① Traffic *Long*	Before going on vacation, I usually make a **rough outline** and then adapt depending on the circumstances
L/S ① System *Short*	I prefer a **low autonomy system**: I take full control of the vehicle and the system just gives warnings		**L/S** ① System *Long*	I prefer a **high autonomy system**: the system takes partly control of the vehicle to assist driving, or even fully control when necessary
L/S ② General *Short*	I think there are universal guidelines about what is right vs wrong		**L/S** ② General *Long*	I think what is good and evil depends upon the circumstances
L/S ②	I will obey traffic regulations under		**L/S** ②	In extreme cases (e.g. emergency),

Traffic *Short*	any condition		Traffic *Long*	breaking traffic rule is acceptable
L/S ② System *Short*	Mobile phones use can cause distractions, therefore drivers should be **prohibited** to use a mobile phone while driving		**L/S** ② System *Long*	Mobile phone is an important tool for people to connect to the world, therefore drivers should **not be prohibited** of using a mobile phone during driving
L/S ③ General *Short*	I think there is a bottom line for companies to enlarge market position		**L/S** ③ General *Long*	I think companies are only supposed to enlarge market position
L/S ③ Traffic *Short*	The government should **control** the size of the automobile market in order to ensure safety and uncrowded driving conditions		**L/S** ③ Traffic *Long*	The automotive industry plays an important role on economy, therefore the government should **support** car companies to enlarge their sales
L/S ③ System *Short*	The in-car system interface designers should focus more on designing for **safety**		**L/S** ③ System *Long*	The in-car system designers should focus more on **attractive** design

INSTRUCTIONS/INTRODUCTION TO THE QUESTIONNAIRE

Thank You!
Thank you for agreeing to participate in our study by completing this questionnaire. The aim of the study is to find out about you, and your driving behaviour.

Confidentiality
Some of the questions might seem a little personal, but please rest assured that they are all vital to the study and that your answers will be anonymous and treated in the strictest confidence.

Answering Questions
Please answer all the questions. If there are some questions that you are not sure about or don`t fully understand, please just give it your best shot anyway.

Vehicle and Traffic Safety Centre
Chalmers University, Sweden

ADAS: Advanced Driving Assistant System
e.g. Adaptive Cruise Control, Backup Monitor, Blind Spot Detect, Lane Departure Warning, Traffic Jam Assist/Stop&Go, Forward Collision Warning…

SECTION A

*For the following questions, please select either **yes or no***

1. Is there any ADAS (Advanced Driving Assistant System) in your car?
Yes ☐ **please answer questions from 2 to 6** NO ☐ **please answer questions from 7 to 10**

	2. Which systems do/did you have in your car?	**3. Do you know how it works?**	**4. Do you use it?**	**5. Do you think it helpful for your driving safety?**	**6. Do you change your drive style after that?**
Adaptive Cruise Control	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐
Backup Monitor	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐
Blind Spot Detect	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐
Lane Departure Warning	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐
Traffic Jam Assist/Stop&Go	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐
Forward Collision Warning	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐
Other (write down) …….….	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐	Yes☐ NO☐

7. Have you heard about ADAS?	Yes☐ NO☐
8. Do you believe it is a good thing?	Yes☐ NO☐
9. Ignore the price, would you like to have it in your car?	Yes☐ NO☐
10. Do you believe it will help you drive safer?	Yes☐ NO☐

SECTION B

*11. Please select which **one** of the following statements best describes you as a driver. Don't worries if none seems to fit exactly, just select the one that is closest. Please select one only.*

- I do not particularly like driving and can sometimes be a little nervous; however I will drive when necessary. ☐
- I am a skilful driver and drive quickly but safely. ☐
- I love to drive fast, even if it is a little dangerous at times. ☐
- I am a competent and careful driver and do my best to stick to the speed limit. ☐

SECTION C

*Please select **only one** scale that best reflects your driving behaviors*

12. I enjoy driving:

1	2	3	4	5
Not at all		Neutral		Very much

13. Compared with the average driver my driving is:

1	2	3	4	5
Much worse		Average		Much better

14. Compared with the average driver my driving speed is generally:

1	2	3	4	5
Much slower		Average		Much faster

15. I feel nervous when driving:

1	2	3	4	5
Not at all		Sometimes		Very often

16. I am interested cars:

1	2	3	4	5
Not at all		Somewhat		A great deal

SECTION D

Please read the following statements and select the most appropriate number from the scale to indicate how often you drive on the following types of roads.

17. I drive on motorways:

1	2	3	4	5
Not at all	Less than once per Month	Once per Month or More	Once per Week or More	On Most Days

18. I drive on major roads:

1	2	3	4	5
Not at all	Less than once per Month	Once per Month or More	Once per Week or More	On Most Days

19. I drive on country (rural) roads:

1	2	3	4	5
Not at all	Less than once per Month	Once per Month or More	Once per Week or More	On Most Days

20. I drive in urban areas:

1	2	3	4	5
Not at all	Less than once per Month	Once per Month or More	Once per Week or More	On Most Days

SECTION E

Please read each of the following statements and select the number on each scale that most accurately reflects your situation.

21. I get irritated when driving (e.g. with delays, others poor driving)

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

22. I rebuke others for their poor driving (e.g. by sounding the horn or flashing the lights)

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

23. I drive in excess of the speed limit

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

24. I drive after consuming alcohol

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

25. I drive when I am tired

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

SECTION F

Please read the following statements and select the appropriate number to indicate how strongly you agree or disagree with each.

26. I see myself as extraverted, enthusiastic

1	2	3	4	5	6	7

Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

27. I see myself as critical, quarrelsome

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

28. I see myself as dependable, self-disciplined

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

29. I see myself as anxious, easily upset

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

30. I see myself as open to new experiences, complex

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

31. I see myself as reserved, quiet

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

32. I see myself as sympathetic, warm

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

33. I see myself as disorganised, careless

1	2	3	4	5	6	7
Disagree	Disagree	Disagree	Neither	Agree	Agree	Agree

Strongly	Moderately	a Little	Agree nor Disagree	a Little	Moderately	Strongly

34. I see myself as calm, emotionally stable

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

35. I see myself as conventional, uncreative

1	2	3	4	5	6	7
Disagree Strongly	Disagree Moderately	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Agree Moderately	Agree Strongly

SECTION G

The following statements are designing for understanding the culture differences among people. Some of the statements may be very personal, **or even you think it is not suitable to ask**. But people are very different, therefore, you should only choose **one** from each pair of statements that is most close to your opinion. Please answer these questions in your intuitive judgment, which means that you don`t need to think deeply about each question.

In-car system*: all electronic systems integrated in the car, include ADAS, information system, entertainment system*

36.	I think inequalities among people are **expected and desired** (e.g. white-collar jobs are valued more than blue-collar jobs). A ☐	I think inequalities among people should be **minimized** (e.g. manual work has the same status as office work). B ☐
37.	I think children should treat parents and older relatives as **equals.** A ☐	I think that children **respect** for parents and older relatives is a basic and lifelong virtue. B ☐
38.	I think managers should rely more on superiors and on formal rules at work. A ☐	I think managers should rely on their own experience and on subordinates at work. B ☐
39.	I think that speaking one`s mind is a characteristic of an honest person. A ☐	I think that for maintaining harmony, it is not good to point out other`s fault. B ☐
40.	I prefer to show my sadness, but not happiness to other people. A ☐	I prefer to show my happiness, but not sadness to other people. B ☐
41.	I think **social network** is my primary source	I think **media** is my primary source of

	of information. A ☐	information. B ☐
42.	I think that international conflicts should be resolved by a **show of strength or by fighting.** A ☐	I think that international conflicts should be resolved by **negotiation and compromise.** B ☐
43.	I think challenge, earnings, recognition, and advancement are important. A ☐	I think family relationships and quality of daily life are important. B ☐
44.	I think that both men and women are almost alike. A ☐	I think that men are usually more likely to be responsible, decisive, and ambitious; women are usually more likely to be care and gentle. B ☐
45.	I can understand that teacher may say "I don`t know". A ☐	I think teachers are supposed to have all the answers. B ☐
46.	I think there should be no more rules than strictly necessary. A ☐	I have an emotional need for rules, even if these will not work. B ☐
47.	I **take some time** before adopting products and technologies. A ☐	I **quickly** adopt new products and technologies. B ☐
48.	I think a person`s ability to be **adaptable** is more important. A ☐	I think a person`s ability to be **stable** is more important. B ☐
49.	I think there are universal guidelines about what is right vs. wrong. A ☐	I think what is good and evil depends upon the circumstances. B ☐
50.	I think there is a bottom line for companies to enlarge market position. A ☐	I think companies are only supposed to enlarge market position. B ☐
51.	If a luxury car drive behind me and force me to give way, I would **not do** it just because it was a luxury car. A ☐	If a luxury car drive behind me and force me to give way, I would **do** it just because it was a luxury car. B ☐
52.	If I travel together with my boss, it doesn't matter who is the driver. A ☐	If I travel together with my boss, I should be the driver. B ☐
53.	In complicated traffic situation, it is important that everybody follows the **traffic signals.** A ☐	In complicated traffic situation, I prefer to have **traffic policeman** to lead the traffic, because it can be more flexible. B ☐
54.	When in traffic, I care mostly about myself. A ☐	When in traffic, I should cooperate with other road users. B ☐
55.	If my car breaks down on the road, I will ask **a friend** to help. A ☐	If my car breaks down on the road, I will ask the **service center** to help. B ☐
56.	When planning my trip, I rely on information provided by **friends.** A ☐	When planning my trip, I rely on information from **public media.** B ☐

57.	When I crash with another car, firstly I should be polite to the other person, and then analyze the factors together. A ☐	When I crash with another car, firstly I state my personal right, and then prefer the third person or police to analyze. B ☐
58.	When selecting a car, my priorities are **engine power and technical specifications.** A ☐	When selecting a car, my priorities are comfort **and safety.** B ☐
59.	In the case of a traffic conflict, men should take more responsibility than women. A ☐	In the case of a traffic conflict, men and women should be held equally responsible. B ☐
60.	Traffic regulation can have some problem. A ☐	Traffic regulation must be perfect. B ☐
61.	In traffic conjunction, I prefer **roundabout.** A ☐	In traffic conjunction, I prefer **traffic light.** B ☐
62.	If there are several ways to go to a certain place, I choose the **same** road every time. A ☐	If there are several ways to go to a certain place, I always like to try **new** roads. B ☐
63.	Before going on vacation, I usually make a very **detailed** plan. A ☐	Before going on vacation, I usually make a **rough outline** and then adapt depending on the circumstances. B ☐
64.	I will obey traffic regulations under any condition. A ☐	In extreme cases (e.g. emergency), breaking traffic rule is acceptable. B ☐
65.	The automotive industry plays an important role on economy, therefore the government should **support** car companies to enlarge their sales. A ☐	The government should **control** the size of the automobile market in order to ensure safety and uncrowded driving conditions. B ☐
66.	The in-car system interface designers should focus more on designing for **safety.** A ☐	The in-car system designers should focus more on **attractive** design. B ☐
67.	Mobile phones use can cause distractions, therefore drivers should be **prohibited** to use a mobile phone while driving. A ☐	Mobile phone is an important tool for people to connect to the world, therefore drivers should **not be prohibited** of using a mobile phone during driving. B ☐
68.	I prefer a **low autonomy system**: I take full control of the vehicle and the system just gives warnings. A ☐	I prefer a high **autonomy system**: the system takes partly control of the vehicle to assist driving, or even fully control when necessary. B ☐
69.	I would like to adopt the **newest** in-car	I prefer to use the in-car system I am **familiar**

	system. A ☐	with. B ☐
70.	The in-car system should only provide me information when it is absolutely necessary. A ☐	The in-car system should provide me redundant information so to remind me any potential issues. B ☐
71.	I **can** accept that the in-car system gives wrong information occasionally. A ☐	I **can not** accept that in-car system gives wrong information. B ☐
72.	I prefer an interface designed for both men and women. A ☐	I prefer an interface that is customized for women or men. B ☐
73.	On interface, I concern more on **esthetic and user-friendliness.** A ☐	On interface, I concern more on system transparency of **how technology works** in the car. B ☐
74.	The interaction between driver and in-car system should be designed so to allow a **dialog** between driver and the system. A ☐	The interaction between driver and in-car system should be designed so the driver only gives **comments** to control the system. B ☐
75.	The in-car system should provide the functions that can easily access to my **social network** (e.g. phone calls, SMS, private talks). A ☐	The in-car system should provide the functions for me to access the **public media** (e.g. Radio, Internet research function, Google map). B ☐
76.	The system should be designed to show which functions are **not working.** A ☐	The system should be designed to show which functions are **working.** B ☐
77.	The in-car system should provide **positive** feedback (e.g. showing me when my driving is good). A ☐	The in-car system should only provide **negative** feedback (e.g. warn me when I make mistakes). B ☐
78	I will read the menu only when I can not operate the in-car system. A ☐	I will read the menu before I use any new in-car system. B ☐
79.	If I and my parents travel together, I would consider both **my own needs and my parents' needs** for the in-car system when we took rental car. A ☐	If I and my parents travel together, I would respect **more of my parents' needs** for the in-car system when we took rental car. B ☐
80.	In-car systems should be installed based only on my **drive needs.** A ☐	It is very important that in-car systems should be installed in order to reflect my **social status.** B ☐

SECTION H

*For each following question, please provide **only one** answer*

81. Age:	
82. Gender:	Male ☐ Female ☐
83. Job/Occupation:	
84. Highest Education Level:	Below Bachelor ☐ Bachelor ☐ Master ☐ PhD and above ☐
85. Current Annual Mileage?	Less than 25000km/year ☐ 25000 to 50000km/year ☐ more than 50000km/year☐
86. What type of Computer or other Digital Products user are you?	I am not interested in ☐ I use them in normal life ☐ I am interested in and use them very often ☐ I am a professional user ☐
87. Which car do you drive now?	

SECTION I

*If you **have** experience being abroad, please answer the following question. You can provide multiple answers for each question.*
*If you do **not have** experience being abroad, please ignore these questions*

88. Which countries did you live in (more than two months), during which time period? **(from latest to pervious):**	Country_____ From_____(Y) to _____(Y) Did you have drive experience in the local area? Yes☐ NO☐ Country_____ From_____(Y) to _____(Y) Did you have drive experience in the local area? Yes☐ NO☐ Country_____ From_____(Y) to _____(Y) Did you have drive experience in the local area? Yes☐ NO☐
89. Which countries did you travelled to (less than two months)? **(from latest to pervious):**	Country _____ Did you have drive experience in the local area? Yes☐ NO☐ Country _____ Did you have drive experience in the local area? Yes☐ NO☐ Country _____ Did you have drive experience in the local area? Yes☐ NO☐

Thank you again for participating in our study!

Video Part

1. Would you feel stressful if you were in this situation?

1	2	3	4	5
Not at all	A little	To some extent	Rather	Very much

2. What possible traffic safety problems did you find in this video?

3. How often have you seen this type of situation happening?

1	2	3	4	5
Never	Very rare	Sometimes	Often	Very common

4. If you were the cam-car driver in the video, how would you probably drive the car?

5. What kind of information and help would you like to get? (Don`t consider the feasibility)

6. In this situation, which systems is helpful for you? (You can choose more than one answer)

Adaptive Cruise Control ☐
Backup Monitor ☐
Blind Spot Detect ☐
Lane Departure Warning ☐
Traffic Jam Assist/Stop&Go ☐
Forward Collision Warning ☐
Other (please write down)……