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Theoretical perspectives on Mobile Phonesusage for Road Safety

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Abstract

In order to investigate some key issues related to mobile phones' security from auser's perspective, this paper explores and presents with using results of a survey conducted in the University of Ioannina, Greece according to which 454 participants were asked about quite many key factors concerning various aspects about a possible interception of their mobile phoneand put in place measures to address mobile phone use among drivers.Mobile phone services are increasingly integrated with other applications (e.g. e-mail and Internet access via "smart phones") and that information on the risks of such devices for road traffic crashes, as well as on potential countermeasures, is therefore likely to evolve alongside the rapidly technological changes taking place in this area. As per the Supreme Court of India appointed committee on road safety, nearly 150000 people die in road accidents in the country every year. Another 5 to 7 lakh people are believed to be injured, leading to handicapped status. Government has made several efforts to enhance road safety in recent years. A major one was the appointment of the committee on Road Transport and Traffic Management (Sunder Committee, 2007). Report of the committee on Road Safety and Traffic Management (Last updated on 26.09.2014) under the Chairmanship of Shri S. Sunder, former Secretary then Ministry of Surface Transport is published on the website[a]. Suggestions/comments on the Report, if any may be sent. Hence, this paper is related to suggestions for the effect of using mobile phones on Road Safety and Traffic Management.

1. Introduction

While the body of research looking at the risk associated with using a mobile phone while driving is growing rapidly, there is much less known about the effectiveness of interventions to address this issue. In the last decade alone, India lost 1.3 million people to road crashes and another 5.3 million havebeenseriouslyinjured. Indiahasthehighest number of road crash fatalities, with a crash occurring every minuteandonedeatheveryfour minutes. While it has just 1% of the world's vehicles, India accounts for over 10% of global road crash fatalities. According to the 'Road Accidents inIndia', 2015 reportof Ministryof Road Transport andHighways(MoRTH),146,133peoplewerekilled in road crashes in 2015 alone including 12,589 children. This number is not only the highest that India haseverrecordedinhistory, butitrepresents a 53.9% increase over the last decade, and nearly a ten-fold increase since1970.

Not only does the loss or impairment of a breadwinner of a family in a road crash inflict emotional trauma on lakhs of families, it imposes a severe financial burden by pushing entire households into poverty. In a 2014 report, the erstwhile Planning Commission of India had estimated that the annual cost of road crashes in Indiais3%ofitsGDP.WithIndia'sGDPin2015-16 being INR 136 lakh crore, these figures translate into an annual monetary loss of INR 4.07 lakh crore. Ironically, it is over five times the budget of the Ministry of Road Transport and Highways, the nodal agency for ensuring road safety inIndia.

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a. Published by The Secretariat for the Committee on Infrastructure Planning Commission, Govt. of India.

Mobile phones play vital roles in human societies; particularly, in developed and developing countries. While individuals are relying on mobile communication deeply, not only the commercial society but also the telecommunication industry is developing new functions and applications which are still modifying the term mobile communication. Voice transmission is no longer the only way individuals use mobile phones. Instead, mobile phone networks have become a new platform where data, information and transactions are exchanged. As a result, the more mobile phones can do, the more information is exposed to danger.

Multi-functional mobile phones which contain camera lenses, Mp3 players/recorders, schedule organizers, gaming functions and the like, have increased the concerns of individual privacy and personal data/information security. The possibility of resembling privacy and security issues common with the Internet is the major concern when transactions are made via mobile phones.

According to the Telecom Regulatory Authority of India (TRAI), Indiacurrently has 1billionmobile phone subscribers. Due to the high penetration of mobile phones,theiruseontheroadhasalso increasedasprovenbythisstudywith1outof2 respondents of this survey having used a phone whiledriving.Unfortunately,inIndia,thereisno data that is being currently captured at the crashsitebyauthoritiestorecordtheconnection between mobile phone usage and crashes. The Government of India in a 2015 report revealed that"2,270"peoplewerekilledin"8,359"crashes dueto'driver'sinattentiveness'.But,thereisno sub-set of this data that points out as to the exact number out of these 8,359 crashes which were caused as a result of mobile phone usage. On the other hand, understanding the growing threat that mobile phone usage during driving possesses,countrieslikeUSAhavebeencapturingdataatthecrashsite.Forexample,in2014,there were 2,955 fatal crashes that occurred on U.S. roadwaysthatinvolveddistraction (10%ofallfatalcrashes),outofwhichtherewere385fatalcrashes reportedtohaveinvolvedtheuseofcellphonesas distractions (13% of all fatal distraction-affected crashes).

Data and information security concern has been fiercely discussed along with the progress of wireless technology, as a result of wireless communications are fundamentally a broadcast-based medium. In a mobile phone communication system, for example, since all transmitted data travel directly between a mobile host and the base station, it is possible to copy all the data of a particular message transmitted through the air. For a mobile phone network, security is the issue critically important to end-users and service providers from various perspectives. In one hand, consumers need to be assured levels of trust to embrace m-commerce; in the other, Service providers benefit from wireless security in protection from fraudulent use of services, protection from unauthorized use of mobile devices (i.e., cloning), managing the distribution of digital rights (that is, distribution of audio and video files under license arrangements), and possibly as a competitive advantage relative to other service providers.

The importance of mobile phone privacy and security becomes increasinglysignificant to publics for numerous reasons. First, the increased connectivity of people has, without question, begun to diminish the concept of being out of reach. No longer can one blame their unexplained absence on a lack of appropriate technology. Rather, one is now often subject to answering questions of where they are at any given time. This raises the matter of people being constantly accountable. It is one thing to be responsible for your office job but to be disturbed at the most inopportune of times is another. Personal information should be exactly that personal. When others choose to disrespect ones privacy and security the victim is often left feeling violated. Further, we are now aware that it is not only those we know who can interrupt

us or cause us grief. Therefore the question will continued to be asked; namely, where should the line be drawn?

Mobile phone subscribers worldwide will hit the four billion mark by the end of 2008,according to the head of the United Nations International Telecommunications Union (ITU) .Most of the increase in cell phone usage will be from the rapidly developing economies of Brazil, Russia, India, and China, which altogether account for over 1.3 billion mobile phone subscribers by year-end.In its daily news digest, the ITU said the number of subscribers has surged nearly 25 percent annually for the past eight years. In 2000, mobile penetration stood at only 12 percent, growing to reach over 60 percent by the end of 2008.

2. Related Work

Although there have been quite many theoretical studies concerning mobile services, a significant mean for investigating and understanding users' preferences is asking their opinion via specific questioning techniques (i.e. in-person delivery or e-mail questionnaires). There exist several survey studies in this direction. A survey started at the end of year 2000 described the current trends in mobile phone usage among adolescents. Another survey was conducted in April 2001, and it examined the mobile phone usage among elderly. The respondents were 300 men and women in their sixties. The survey conducted in November 2000 involved 1000 subjects and investigated the use of mobile phones in every day urban life. All of these surveys indicate the growing importance of mobile phones in everyday life and the increased popularity of new features such as email.

In a recent survey of mobile users versus shoppers in Finland, Germany and Greece , mobile shoppers were less focused on price and more on ease of use than mobile users but these differences were not consistent across countries. Thus the findings may indicate that the early adopters of mobile data services and adopters of traditional mobile services are not that different. The above remarks were also verified by some exclusive studies for the Greek mobile market.

3. Research Analysis andResults

3.1. Methodology

Survey was conducted using in-person delivery technique, with a total of 454 respondents participating in this survey. All the respondents were students in University of Ioannina and were asked for their participation in a questionnaire. Having such a supervised survey technique ensures that each respondent understands each of the questions and answers them correctly.

Targeting such a group is due to the fact that we wanted the participants to form a representative set in a certain age area (18-24), which corresponds to a major percentage of the overall users in the current mobile Greek market and thus have the potential to adopt new services as well. As far as concerning the gender statistics, 54,53% of the participants were men, while 42,73% were women. Selected 'gender' to be main variable, as it appears to be a rather significant factor towards the adoption of mobile services.

3.2 Survey Results

Survey was categorized in two main parts. In the first one, we are surveying some generic issues concerning the gender and the kind of studies, while in the second one, emphasize on the users' positions about their concern for the fact that a third person could intercept their mobile phone and extract valuable and personal information. (i.e. position, phonebook, messages, discussions etc.).

3.2.1 Generic Queries

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3.2.1.1. Gender and Studies Profile

The participants were asked to define their gender and kind of studies. The results are shown in figure.1and figure 2.

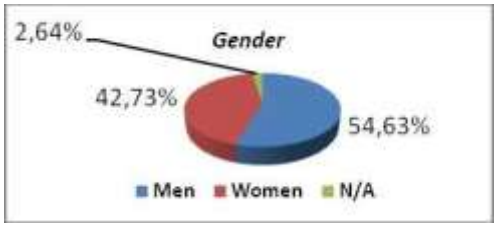

Figure 1: Percentage of participants by gender.

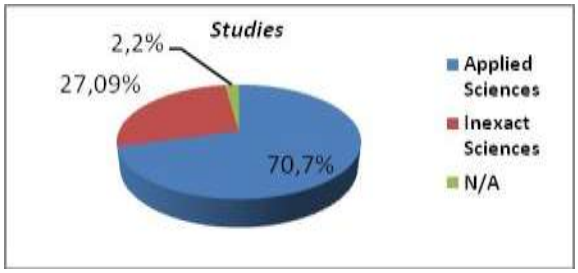

Figure 2: Percentage of participants by kind of studies.

3.2.2. Specific Queries

3.2.2.1. Location Awareness

The queries No 3, No 4 and No 5 of questionnaire hadbeen tried to determine this level. In specific they answer how concerned they are in case of a third person (not the provider) could know their position with a few meters accuracy, neighborhood accuracy and if and when they have passed by a certain point correspondingly. The results by gender are shown in the three following figures.

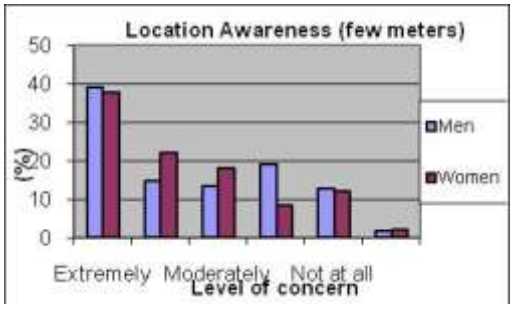

Figure 3: Level of concern about location awareness with a few meters accuracy by gender.

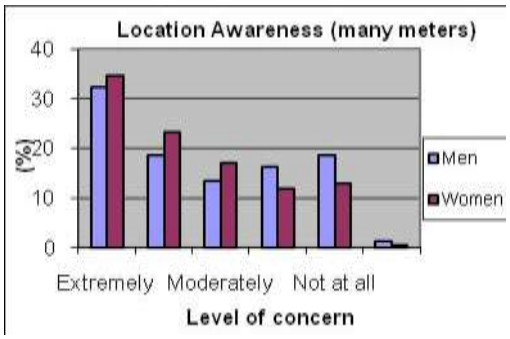

Figure 4: Level of concern about location awareness with neighborhood accuracy by gender.

As the previous figures depict, the women are more concerned in general. This is also confirmed by a

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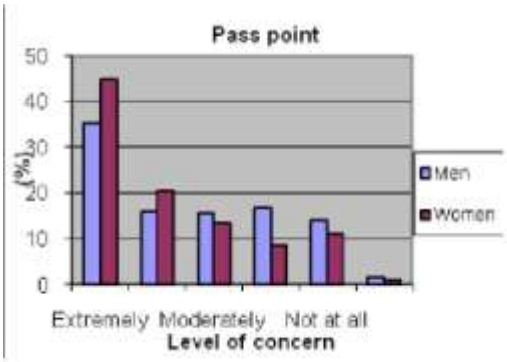
statistic analysis has been made for the third query of our questionnaire. The results are shown in the Table 1.

Women seem to be more concerned than men (59.8% vs. 53.6%)

Pearson Chi-Square= 14.120, df=5, p-value = 0,0149		Gender		
		Men	Women	Sum
Query No 3	Highly	97	73	170
		39,1%	37,6%	38,5%
	High	36	43	79
		14,5%	22,2%	17,9%
	Enough	33	35	68
		13,3%	18,0%	15,4%
	Not too much	47	16	63
		19,0%	8,2%	14,3%
	Not at all	31	23	54
		12,5%	11,9%	12,2%
	N/A	4	4	8
		1,6%	2,1%	1,8%

Table 1: Statistic analysis for local awareness(Query No3) by gender.

Women seem to be more worried in case of query No 5 too. According to results the level of concern is 65,5% for women versus 51,6% for men.In the sixth figure of this subsection, the results that come from the participants' answers regarding the level of concern about location awareness (Query No3-few meters) by kind of studies.



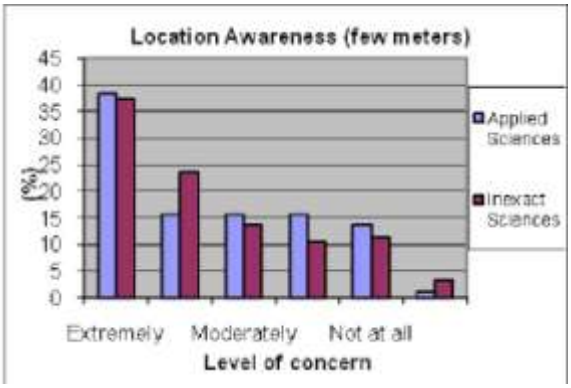


Figure 5: Level of concern about location awareness by gender. Figure 6: Level of concern about location awareness

A remarkable note coming out of this figure is that the students of applied sciences seem to be more concerned about the possibility of location awareness, even if in general we notice that all the students have these security issues on their mind and seem to worry about them.

3.2.2.2. Interceptions

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In order to have a deeper view of participants' awareness level, some common questions regarding various kinds of interception had been asked. The participants were asked to determine their level of concern answering the queries No 6 to No 13 and the results are shown below.

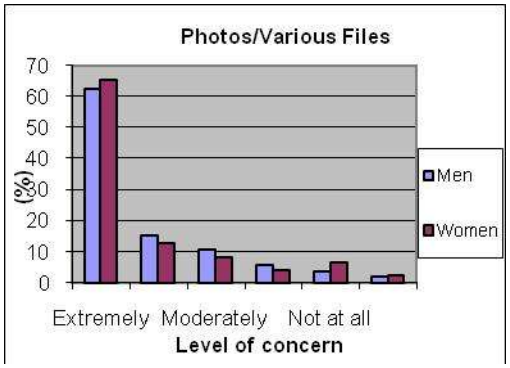

Figure 7

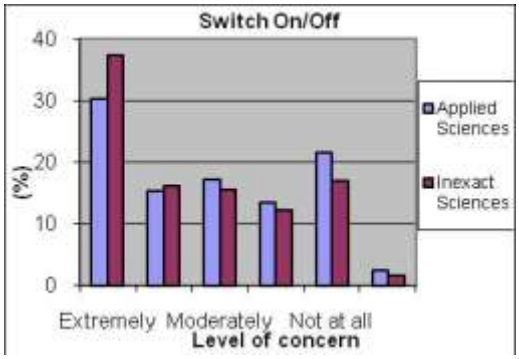

Figure 8

Figure 7: Level of concern about photos/various files interception by gender.
Figure 8: Level of concern about the chance that a third person knows whenyou turn on/off your phone.

The figure 7 is a typical one and could make out that it depicts very well the answers they are given to the queries No 6 to No 9 and No 9 to No 13. There is no considerable difference between the results of the two genders. For the same set of queries the results by kind of studies are also similar. The results that represent men and women are similar to those that represent students of applied and inexact sciences correspondingly. The only results that made a difference are shown in the figure 8 and are related to the query No 10.

According to the results, the students of inexact sciences seem to be more concerned than these of applied about the fact that a third person could know exactly when they turn on/off their mobile phone. The analogy between applied/inexact sciences and men/women applies to this case too. Statistic analysis showed us that women seem to be more worried about this chance than men (55.7% vs. 41.9%) and about the fact that an intruder could deprive them of the ability to use their phone temporarily (73.7% vs. 62.5%).

3.2.2.3. Considerations about safety and security

The objective of this particular subsection of research is to determine if oparticipants consider that the previously mentioned kinds of interception are possible to happen, as well as if they assume communication through mobile phones safe and if they are informed about that mobile phone's options and characteristics affect its security.The answers of the query No 14 are shown in the figure 9 below, by kind of sciences.

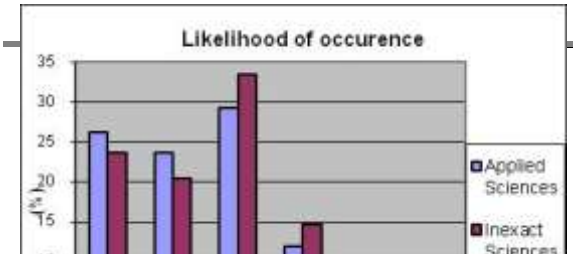

Figure 9: Level of concern about the likelihood that interceptions occur bykind of sciences.

It is obvious the fact that all the students, regardless of their kind of studies, believe that the various interceptions possibly occur and according to their answers they do not consider communication through mobile phones safe.According to statistic analysis' results, men consider communication safer than women (13.7% vs. 3.1%) and they are better informed about their phones (27% vs. 13.4%).

4. Conclusions

A major part of the mobile users are extremely concerned about the most kinds of interception and the fact that an intruder could gain unauthorized access to their devices. Furthermore, we argue that there is no feeling of safety and no advanced technical knowledge of their mobile phones among young adult population.

The use of wireless devices is here to stay. The number of devices, and more importantly, the types of devices, will only increase over time. There are undeniable cost benefits and increases in efficiency that can be derived from their use. But these benefits will only be actualized if a culture of privacy is developed. As wireless communication technology becomes fully integrated into information systems and business processes, it is inevitable that substantial amounts of personally identifiable information will flow over the airwaves. Since radio waves are a broadcast medium, capable of being received by anyone who is in range, reception of the signal by unauthorized receivers cannot be prevented. Therefore, those responsible for personal information must ensure that "data-in-motion" must be strongly encrypted at all times. Finally we should have in mind that users are critically affected by security and privacy issues, and play a key role in protecting themselves and others.

5. Discussions

Consider the following statistics: 360 people die from road accidents every day in India, a full 10% of the global total. During the year 2011, the total number of person killed in road accidents were 142,492 out of which 12,867 (9%) were pedestrians.. As of 2007, the rate of deaths from road accidents per 100,000 of the population was 16.8% in India. The Working Group on Road Accidents, Injury Prevention and Control set up by the Planning Commission in the year 2000 had assessed the social cost of road

accidents in India at Rs. 55,000 crores which constituted about 3% of the GDP of the country in the year 1999-2000. These statistics present a rather harrowing picture of the state of affairs. Yet, the sad truth is that these regularly occurring road accidents attract less media attention than other, less frequent but more unusual types of tragedies. In 2005, the Ministry of Road Transport and Highways, Government of India ("MoRTH")constituted the Committee on Road Safety and Traffic Management to make proposals for a national level road safety organization and recommend the functions and responsibilities of the proposed organization. The Committee defined road safety as a multi-sectoral and multidimensional issue that incorporates the development and management of road infrastructure, provision of safer vehicles, legislation and law enforcement, mobility planning, provision of health and hospital services, child safety, urban land use planning, etc.

Government has made several efforts to enhance road safety in recent years. A major one was the appointment of the committee on Road Transport and Traffic Management (Sunder Committee, 2007). The Committee defined road safety as a multi-sectoral and multidimensional issue that incorporates the development and management of road infrastructure, provision of safer vehicles, legislation and law enforcement, mobility planning, provision of health and hospital services, child safety, urban land use planning, etc. Report of the committee on Road Safety and Traffic Management (Last updated on 26.09.2014) under the Chairmanship of Shri S. Sunder, former Secretary then Ministry of Surface Transport is published on the website. Suggestions/comments on the Report, if any may be sent. The resultants are very interesting and can be considered as a potential guide by various mobile operators for their future technological investments. Governments need to be proactive now, and put in place measures to address mobile phone use among drivers, while simultaneously monitoring and evaluating the effects of these interventions.

Hence, this paper is related to suggestions for the Road Safety and Traffic Management for its important to recognize that mobile phone services are increasingly integrated with other applications (e.g. e-mail and Internet access via "smart phones"), and that information on the risks of such devices for road traffic crashes, as well as on potential countermeasures, is therefore likely to evolve alongside the rapid technological changes taking place in this area. Governments need to be proactive now, and put in place measures to address mobile phone use among drivers, while simultaneously monitoring and evaluating the effects of these interventions. The resultants are very interesting and can be considered as a potential guide by various mobile operators for their future technological investments. In this way the body of evidence in this area will grow, allowing future policy decisions to be grounded firmly inscience.

Roadtrafficinjuriesaffectallagegroups,buttheirimpactisparticularlystriking among the young – they are the leading cause of death worldwide among thoseaged15–29years.Trendssuggestthatbetweennowand2030,road traffic injuries will rise from being the ninth leading cause of death globally to become the fifth.

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