M O N A S H U N I V E R S I T Y

DEVELOPMENT AND TRIAL OF A METHOD TO INVESTIGATE THE ACCEPTABILITY OF SEAT BELT REMINDER SYSTEMS

Vägverket
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A C C I D E N T R E S E A R C H C E N T R E

DEVELOPMENT AND TRIAL OF A METHOD TO INVESTIGATE THE ACCEPTABILITY OF SEAT BELT REMINDER SYSTEMS

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Abstract:

This report details the development and trial of a method to assess the acceptability of seat belt reminder systems. The method is based on the simulation of social processes likely to occur with the introduction of the reminder systems and measurement of attitudes, motivations, and likely behaviours. The method was trialed using Australian participants recruited using a telephone survey concerning seat belt use and related attitudes. The results were very positive with respect to the acceptability of seat belt reminders in Australia. Drivers with relatively low wearing rates were not opposed to seat belts but appeared not to have developed a seat belt wearing habit in some driving situations. Participants were generally positive about the likely introduction of seat belt reminder systems. Recommendations are made for the application of this method in Sweden and elsewhere, and for the application of the method to assess the likely acceptability of other ITS systems during their development.

Key Words:
Seat belt, Intelligent transport system, Technology, Acceptability

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CHAPTER 1: OVERVIEW

It is widely accepted that consistent use of seat belts in motor vehicles substantially reduces the incidence of fatalities and serious injuries resulting from crashes (e.g. Evans, 1996; Petridou, Skalkidou, Ioannou, & Trichopoulos, 1998; Robertson, 1996; Shibata & Fukuda, 1994). Recent Australian research found that approximately 20% of fatally injured car occupants in Victoria[1] (in 1997) were not wearing seat belts (VicRoads, 1998), while seat belt wearing rates in Victoria are consistently above ninety percent. It was estimated that the relative risk of being killed in a crash was four times greater for unbelted compared to belted occupants. Turbell and Larsson (1999) reported that seat belt use reduces the risk of injury by up to 50% and that as many as 7,000 lives could be saved in the European Union each year if seat belt non-use was addressed. A recent US report based on 1993 figures estimated that 42% of the crash costs and 18% of the medical costs of crashes in that jurisdiction resulted from seat belt non-use (Miller, Lestina, & Spicer, 1998). It is clear that increasing seat belt use is an important priority for many governments, reflected in the introduction of mandatory seat belt legislation in several countries.

Legislation to mandate seatbelt use is widespread, but wearing rates vary substantially between jurisdictions. Legislation may be seen as having a number of psychological actions. It serves to threaten and impose official punishment on offenders and, more importantly, it encourages the development of social norms and behavioural habits that are consistent with the legislation and safe driving behaviour. The effectiveness of legislative approaches in this regard is most likely dependent on the pre-existing social norms and behavioural habits of those subject to the legislation.

Thus, while mandatory seatbelt wearing legislation provides a threat of punishment for non-use of seatbelts, it also encourages the formation of social norms that are positive towards seatbelt use and negative towards non-use, and the development of appropriate behavioural habits or automatic behaviours that result in ongoing seatbelt use. The motivational factors underlying non-use are most likely related to these two functions of legislation - it may be that the threat of punishment provided by the legislation is not sufficiently strong to affect all drivers (especially if enforcement efforts are not intense enough to support the legislation with a high perceived risk of detection), or that the legislation has failed to induce changes in social norms and behavioural habits in subsections of the driving community for a number of possible reasons.

The proposed specification for seat belt reminder systems will make it uncomfortable for drivers to drive while seatbelts are not fastened correctly. The proposed systems will act to motivate drivers and passengers to use their seatbelts while not interfering with the driving or seatbelt use habits of those drivers and passengers who use their seatbelts appropriately. Unlike legislative or public-education approaches to improving wearing rates, reminder systems seek to encourage drivers and passengers to comply with seatbelt legislation by making non-use uncomfortable rather than encouraging compliance through the creation of social norms, habitual behaviours, and the threat of punishment, although the final outcome may be the development of stronger norms and habitual seat belt behaviours. It is unclear how non-users will respond to this approach, but there are a number of possibilities, including:

- They may choose to comply with the seatbelt requirements and as a result develop safer seat belt habits;

[1] Victoria is the second most populous State of Australia, situated in the south-eastern part of the mainland.

- They may choose to comply reluctantly (as a result of their attitudes towards seatbelt use and the use of reminder systems) with the seatbelt requirements without developing appropriate behavioural habits and while relying on the activation of the system to act as a reminder;

- They may avoid purchasing vehicles with this technology for as long as possible; or

- They may attempt to tamper with the technology to allow continued driving without wearing a seatbelt.

This research project was commissioned by Vägverket (the Swedish National Road Administration). Its aim was to develop a research method that could then be used in Sweden to assess the likely effect of seat belt reminder systems and other technological systems on drivers. It was considered that the reminder systems would be introduced in the broader social, political, and behavioural context of driving and that these issues needed to be incorporated into the method. Thus, it was considered that the assessment method needed to focus on the behaviours of drivers in the contexts in which decision-making would occur, while allowing other potential influences to act on the driver as they might be expected to when the reminder systems become more-widely available. The development of the method is outlined in this report.

The descriptive model presented in Figure 1 served as a starting point for the project. A number of factors presented in the model were thought likely to influence the effect of seat belt reminder systems on driver behaviour. These include the following:

- Whether a driver normally uses a seat belt: It is expected that the introduction of reminder systems will not influence drivers who already use seat belts, although it is possible that it will influence the motivation that encourages seat belt use amongst this group. While they may currently use seat belts because of some intrinsic safety motivation, having the vehicle require seat belt use may shift this motivation. This will need to be investigated in future, as any shift in seat belt motivation away from safety-related motivations may ultimately impact on safety-related motivations in other areas of driver behaviour.

- Underlying motivational factors: The impact of reminder systems on seat belt behaviour will most likely depend on the motivational factors that drive failure to use seat belts in the non-user group. There is a need to investigate this and the driver characteristics associated with different motivational factors for non-use as it may be possible to target non-wearers with appropriate public education programs. The introduction of reminder systems may result in some shifts in motivational factors amongst the non-users.

- Social influences: It is highly likely that social influences will play a major role in the effect of seat belt reminder systems on seat belt behaviour. New technology of this type is likely to result in discussion between drivers, and it is likely that in some instances these discussions will centre on negative reactions to the technology and ways to circumvent it. It is important that social influences be taken into account in any attempt to predict the effect of the reminder systems.

- Decision making processes. Behavioural decision making processes are likely to be the final determinant of the reaction of individuals to the reminder systems. While social influences and motivational factors will play a role, the processes underlying the decision of the individual in the context of seat belt wearing needs to be assessed. Influences here

will include personality factors and cognitive processes as well as trip-purpose factors and more-general attitudinal factors.

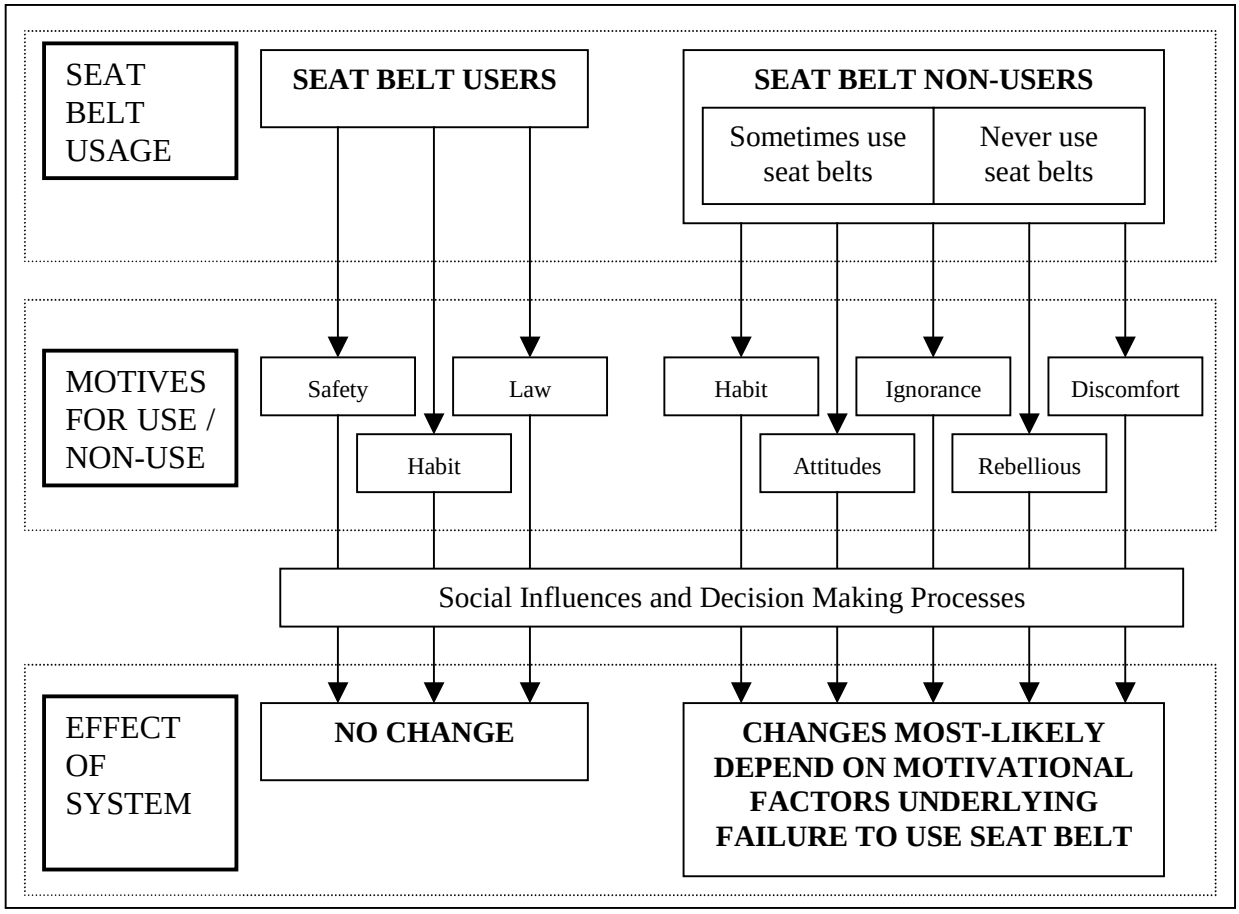

Figure 1: General Model of the Effect of Reminder Systems

Although the focus of the project was methodological, it incorporated a number of components that are reported here. These include the following:

- A focused review of the empirical literature relevant to the project;
- A discussion of theoretical or psychological issues relevant to seat belt use and to the acceptability of ITS technologies;
- The development and description of the proposed method itself;
- A summary of the outcomes of a small pilot of the method used as part of its development;
- A report of the results of a large random-number telephone survey used to collect seat belt wearing data and to recruit participants for the trial of the method;
- A report of the large-scale trial of the acceptability-assessment method;
- A discussion of the results of the survey and trial focused on the likely acceptability of seat belt reminder systems in Australia;
- A discussion of the issues likely to arise in the application of the method in other cultural contexts; and
- A discussion of the application of the method to other ITS technologies and systems.

CHAPTER 2: LITERATURE REVIEW

This Chapter presents a focused review of the literature directly relevant to this research project. A number of issues are addressed, including the complex nature of seat belt behaviours, characteristics associated with seat belt use and non-use, and acceptance of technology.

A. THE COMPLEXITY OF SEAT BELT BEHAVIOURS

Seat belt wearing rates less than one hundred percent are usual in observational studies. This may reflect consistent non-use by a relatively small group of drivers and occupants; inconsistent non-use by a larger group of drivers and occupants; or some combination of these. The effects of seat belt legislation and technological innovations will depend on which of these possibilities underlies non-usage rates, as the motivational and decision-making processes underlying non-use are likely to be different in each.

Measures of seat belt use have generally been obtained in two ways: by observation (mostly in moving traffic) or by self reports (either interview or questionnaire). Observational studies have been criticised for classifying drivers and/or passengers by a single observation only (Fhaner & Hane, 1973). This makes it impossible to ascertain whether non-using passengers and drivers never wear seat belts, or if they have failed to wear a restraint on that particular driving trip for one of a number of potential motivational and situational reasons.

The importance of this issue is apparent in research such as that reported by Fockler and Cooper (1990), for example, who showed that twenty-one percent of self-reported regular users agreed that that they would not wear belts on short trips. Other research has found that drivers are more likely to wear seat belts when driving long distances or at higher speeds (Fhaner & Hane, 1973; Jonah & Dawson, 1982; Knapper, Cropley, & Moore, 1976).

The majority of seat belt studies do not differentiate between inconsistent users, consistent users, and consistent non-users. Self-report measures have used variable classifications such as high versus low use, usual or regular use, and occasional use (Fockler & Cooper, 1990; Knapper et al., 1976; Roberts, 1984; Sweetser, 1967). Consequently, reported findings have been somewhat inconsistent. Nonetheless, Fockler and Cooper (1990) suggest the problem relates more to identifying consistent non-users, and Wilson (1990) has reported that inconsistent users more closely resemble consistent non-users than consistent users. Whether this is true in jurisdictions such as Australia and Sweden, however, remains to be determined.

Comparisons of observational and self-report data have shown weak positive associations between self-reported and actual seat belt use (Fockler & Cooper, 1990; Hunter et al., 1993; Stulginskas, Verreault, & Pless, 1985). Stulginskas et al. (1985) examined the use of seat belts among parents and children with interviews conducted on the same day as observations. They found that only 76% of the parents who reported always using seat belts were also observed wearing them. Fockler and Cooper (1990) used repeat observations with interviews ranging from on-the-spot to unspecified time lapses. They found that while 73% of observed seat belt users reported always using belts, almost 43% of observed non-users also reported there were no conditions under which they would travel unrestrained. The most recent study by Hunter et al. (1993) was based on a single observation of drivers who responded to a questionnaire sent

several weeks later. They found that of those respondents who said they always wore belts, 87% were observed wearing belts while 13% were not.

Seat belt use appears to be a complex behaviour. Self-reports of seat belt use do not necessarily reflect actual behaviour on all driving trips, and it is not clear from observational studies or self-report studies whether non-use rates reflect widespread occasional non-use or less common consistent non-use. If seat belt use is similar to other behaviours, it is likely that a broad range of factors have a causal involvement and that situational and motivational factors may play an important role for many road users in high-use jurisdictions such as Australia and Sweden.

B. CHARACTERISTICS ASSOCIATED WITH USE AND NON-USE

Understanding the situational and personal characteristics associated with seat belt use and non-use is important for a number of reasons, including the following:

- This understanding provides material suitable for public education programs targeting seat belt use. Material in such a campaign can be made more relevant by using the situations and characteristics associated with non-use in advertising content.

- Understanding the characteristics associated with non-use can also provide information about potential targets (groups of road users or specific situations) for public education and enforcement programs.

- Most importantly for the present project, the way in which technological innovation, enforcement, legislative change, and public education programs influence seat belt use is likely to depend on the personal and situational characteristics that also influence seat belt decisions.

For the latter reason in particular, a brief review of the literature was undertaken to investigate the characteristics associated with seat belt use and non-use.

Sex and Age

Males are less likely than females to use seat belts (Eby & Olk, 1998; Foss, Beirness, & Spratter, 1994; Leigh & Fries, 1992; Loo, 1984; Reinfurt, Williams, Wells, & Rodgman, 1996; Wilson, 1990). A 1994 Australian study which compared use across sex, seating position, and urban arterial versus rural roads in Victoria confirmed this for drivers and front seat passengers, however, for rear seat passengers this was only true on rural roads (Diamantopoulou, Dyte, & Cameron, 1996). Male rear seat passengers had higher use than females on urban arterial roads.

Diamantopoulou et al. (1996) also found that on urban arterial roads, drivers aged 26-29 years had the lowest seat belt wearing rate (96.7%), while on rural roads 22-25 year-olds had the lowest rate (92.9%). American observational research has reported comparable figures with road users under 25 years of age having the lowest wearing rate in one study (Lund, 1986) and those under 35 in another (Reinfurt et al., 1996).

Situational Variables

Some links have been found between seat belt use and both seating position and time of day. Passengers are less likely to use seat belts than drivers (Eby & Olk, 1998). This difference is largest for rear-seat passengers and to some extent, for passengers in the centre-front position (Diamantopoulou et al., 1996). Foss et al. (1994) found seat belt use was less common after midnight than before midnight.

Diamantopoulou et al. (1996) reported that the relationship between time of day and seat belt use by drivers and front seat passengers in Victoria was dependent on driving location. On urban arterial roads, drivers and front seat passengers had higher wearing rates at night than during the day. On rural roads, drivers had a lower seat belt wearing rate at night than during the day while front seat passengers had similar rates for day and night. Rear seat passengers however, (who had the lowest wearing rates overall) had lower rates at night than during the day regardless of location.

While an association has been found between seat belt non-use and older model cars (pre-1985) and for vehicle types other than cars, especially pickups (Lund, 1986; Reinfurt et al, 1996), it is unclear whether seat belts were fitted in all the vehicles observed. Therefore, these findings may reflect the availability of restraints rather than driver choice.

Education and Socioeconomic Status

Lund (1986) suggested formal education might be related to seat belt use for two reasons. Lund argued, first, that education increased exposure to positive information about occupant protection and second, that education initiated people into a group where protective behaviour is (arguably) a normative value.

Researchers have found that seat belt non-users are less educated than users (Petridou, Zavitsanos, Dessypris, Frangakis, Mandyla, Doxiadis, & Trichopoulos, 1997; Wilson, 1990). However Clark (1993), who expected that seat belt use would be greater at an American university campus than for the general community, found that seat belt use by members of the university community was significantly lower than that in the broader the community. It is not clear whether age and sex interactions may partially account for this finding.

There is some evidence that seat belt use is more common amongst people of higher socioeconomic status (Lund, 1986; Petridou et al., 1997; Shinar, 1993). Studies have found that seat belt use was lower among low income earners than high income earners (Lund, 1986; Taira, Safran, Seto, Rogers, & Tarlov, 1997), and among those classified as blue collar workers compared to white collar workers (Geller, Davis, & Spicer, 1983; Shinar, 1993).

Risky Behaviour and Health

There is evidence that seat belt non-use is associated with poor driving records, risky driving behaviour, and crash involvement (Evans, 1996; Janssen, 1994; Reinfurt et al., 1996; Stewart, 1993; Wilson, 1990). Seat belt non-use has also been associated with higher proportions of single vehicle crashes, rollovers, and convictions resulting from crash involvement (Hunter, Stewart, Stutts, & Rodgman, 1990; Hunter et al., 1993), and shorter headways (i.e. close

following; Evans & Wasielewski, 1983). However, Wasielewski (1984) was unable to replicate the latter finding.

Donohue (1988) reported that the belief that 'driving is risky' predicted seat belt use, and seat belt non-use has been associated with negative health behaviours. Non-users have been found not to value maintaining good health (Donohue, 1988), to be less likely to have health insurance, and to be more likely to have an arrest record (Reinfurt et al, 1996). They have been found to hold more general negative attitudes about safeguarding health, including the belief that people have the right to put their own health at risk as opposed to a moral responsibility not to risk their health (Eiser, Sutton, & Wober, 1979). Further, non-use has been associated with higher emotional reactivity to frustrating situations, lower levels of courtesy, and less caution in hazardous conditions (Loo, 1984).

A 1982 German study (Roesler & Petrossian, 1982) administered a questionnaire measuring general attitudes toward driving and accident anxiety. It was found that seat belt non-use was associated with higher levels of crash-related anxiety. Moreover, an English questionnaire study found that participants with low accident anxiety showed a stronger relationship between attitude towards seat belts (opinions about the comfort and effectiveness of belts) and behaviours (actual use of seat belts), than did high anxiety participants (Ashton & Warr, 1976).

American studies with adolescent samples have found that those reporting never or intermittent seat belt use were significantly more likely to feel down, have decreased home support, have problems with school and the law, have been on probation, and feel that life in general was not going very well (Schichor, Beck, Bernstein, & Crabtree, 1990). Schichor et al. (1990) argued that non-use and intermittent use of seat belts might be a manifestation of a lack of self-care, depression and/or a preoccupation with family, school, or societal problems.

In addition, several studies have found that failure to use a seat belt was associated with higher alcohol involvement (Hijar, Flores, Lopez, & Rosovsky, 1998; Foss et al., 1994; Reinfurt et al., 1996; Williams & Wells, 1993), and more drug use (Wilson, 1990). Smoking and non-use of seat belts have also been associated (e.g. Hersch & Viscusi, 1998).

Perceived Effectiveness and Personal Choice

An early study by Eiser et al. (1976) found that 51.6% of seat belt non-users agreed with the statement "seat belts really make driving much safer" compared to 92.2% of users. A study using a self-report measure found that seat belt use was unrelated to perceived effectiveness amongst Swedish and US undergraduates (Svenson, Fischhoff, & MacGregor, 1985). In one study (O'Day & Filkins, 1983), 50% of participants reported fear of entrapment by the seat belt in a crash.

Studies have found that many non-users have no objections to seat belts *per se.* Rather, they report superficial reasons for non-use. These have included carelessness, forgetfulness, and the failure to acquire the habit of using seat belts (Knapper et al., 1976; Wittenbraker, Gibbs, & Kahle, 1983), inconvenience and discomfort (Donohue, 1988; Fhaner & Hane, 1974). Svenson et al. (1985) found that seat belt use was positively related to their perceived convenience and popularity amongst Swedish and US undergraduates.

A social responsibility motive was found among women in a 1990 American study. Martin and Newman (1990) found that women who intended to wear seat belts believed that the action would encourage others to wear seat belts, and that they should encourage others in this way.

Finally, other important personal variables found to be related to seat belt use are favorability towards seat belt laws (Jonah, 1984; Jonah & Dawson, 1982) and the value of freedom of choice (Donohue, 1988).

Internal and External Causal Factors

It is clear in the discussion presented above that seat belt non-use is associated with both internal, psychological factors and external, situational factors. Seating position and time of day, for example, were related to seat belt use, as were internal factors such as attitudes towards health.

This is an important aspect of seat belt use and, in a broader sense, of driving in general. The involvement of both internal and external causal factors in seat belt behaviour means that there is a need to consider both in assessing the factors that influence or determine usage patterns, and the effects of any new measures targeting seat belt use. The introduction of seat belt reminder systems is not an exception to this. The introduction of new reminder system technology will occur in the context of already-existing seat belt behaviours that are influenced by internal and external factors. The new technology is unlikely to have the same effect for all road users or in all situations, and the assessment method developed here has to ensure that the interaction between the technology and these causal agents is investigated fully.

C. THE INTRODUCTION OF SEAT BELT REMINDER SYSTEMS

The seat belt reminder system technology represents a step away from more-traditional behaviour change programs. Some traditional programs attempt to gain compliance using threats of negative consequences if seat belts are not used – perhaps involving legislative and enforcement measures. Some seek to have road users behave safely by influencing factors considered to affect seat belt use – perhaps involving education programs or appeals to factors such as responsibility or fear.

The reminder system approach avoids having to understand the basis of seat belt behaviour (in one sense) and seeks to require compliance before the vehicle can be driven comfortably or efficiently. As the technology does not rest on a particular understanding of the factors underlying seat belt use (which may be different for different groups of road users), its impact is likely to be more general. As it is a technological or system solution, its impact is likely to be larger.

As is generally the case with technological innovation, however, there is a need to understand the likely response of those affected. Waller and Green (1997) touch on this issue in relation to the unsuccessful attempts to introduce seat belt interlocks in the United States. It is in this context – understanding the interaction between the response of the road user and the effectiveness of the reminder systems – that an understanding of the internal factors associated with belt use take on substantial importance. It is likely that the reaction of road users to this new technology, and therefore in part the success of the new technology, will depend on the processes responsible for seat belt use.

If, as was suggested above, inconsistent users are influenced by situational factors, then there is a need to understand how the situational factors that are associated with non-use will interact with the new technology. Similarly, if consistent non-users are influenced by internal or motivational factors, there is a need to understand the likely effect of the reminder systems on these.

D. ACCEPTABILITY

Acceptability is an important issue in the introduction of new technologies. A system like the seat belt reminder system may perform its role as designed, but its effect on behaviour is likely to be strongly related to the extent to which vehicle occupants accept it. Failure to accept it, or opposition to the device, may result in attempts to disconnect or tamper with the device or (in extreme circumstances) encourage people to purchase vehicles that are not fitted with it.

There is very little literature concerning the acceptability of ITS technologies in motor vehicles, and suprisingly little literature addressing this issue in the context of broader technological developments in the community. Most of the broader literature is focused on reactions to specific technologies rather than trying to understand the technology- and person-characteristics that might lead to greater or lesser acceptance.

In the narrower context of in-car technologies, De Waard and Brookhuis (1999) distinguish between levels of automation based on the degree of control of driving exerted by the vehicle. They argue there are five levels of ITS ranging from no automation through to full automation. Seat belt reminder systems fall into their second category – decision support. Although discussing all levels of automation, de Waard and Brookhuis (1999) stress the need to take the social context into account when considering the likely impact of new technology. They note that a perfect technology may not be used if it is not accepted. They note that systems that provide information and that do not restrict the driver's freedom are more likely to be acceptable. The seat belt reminder system is this type of technology, although failing to follow the system's advice has negative consequences for the driver that may influence the system's acceptance.

A number of potential concerns about the introduction of ITS technologies into vehicles are discussed by Stanton and Young (1998), particularly those related to automation. Their discussion of trust as an issue in ITS technologies is relevant to the acceptability of the seat belt reminder system. They note arguments that trust in technology depends largely on the dependability of the technology – suggesting that the reliability of a system like the seat belt reminder system may be a key issue for users. Stanton and Young suggest that it is easier to build up trust in the first place with a reliable system than it is to dispel distrust. This suggests that early experiences with the seat belt reminder technology may be important for ongoing acceptability in the community.

In relation to technologies in general, Gardner and Gould (1989) note the general belief that opposition to technological innovation results from an overestimation of the risks of the new technology resulting from a lack of knowledge or understanding. They note, however, that there may be some doubt about this explanation of opposition. In particular, they argue that the understanding of risk held by non-scientists is broader than that of scientists. While those driving the move towards increasingly complex technologies think of risks in terms of benefits and costs, lay-people are more likely to have a complex understanding of risk that incorporates a wider range of community concerns. Gardner and Gould undertook research to investigate the factors associated with opposition to technology in two broad samples drawn from the

United States. Their results suggest that the acceptability of technology is not a product of technical understanding, but rather more complex considerations.

Davis (1993) develops and tests a technology acceptance model, seeking to understand the characteristics of technological innovation that lead to acceptance of the technology by users. He notes the common finding that low levels of user acceptance restrict the success of technologies. Davis' model is broadly based on a less-recent view of attitudes arising from psychological literature, but in spite of this he does compare the influence of perceived usefulness and perceived ease of use on acceptance. He collected data in relation to information technology acceptability, and reported that usefulness (rather than ease of use) was a key predictor of acceptability. He concludes that these data argue against the then current focus on user friendliness and in favour of a stronger focus on perceptions of usefulness. The implications of this view for the seat belt reminder system relate to the marketing of the system once it is introduced. According to Davis' view, convincing people of the usefulness of the technology may be an important issue.

It is clear that acceptability is a complex issue, and one that is important for the successful use of seat belt reminder systems and other ITS technologies. It is also clear that reliability may be an important issue for users, and that technical understanding of the technology and its impact in simple benefit-cost terms may not be sufficient to guarantee acceptance. Acceptability was the central focus of this study.

E. ISSUES

A number of important issues discussed in this Chapter need to be further considered given the focus of this project. The first of these is the distinction suggested earlier between inconsistent users and non-users, where it was suggested that seat belt wearing rates less than 100% might represent some combination of non-users (who for some reason do not wear seat belts) and inconsistent users (who sometimes wear seat belts and sometimes do not).

This issue is important for a number of reasons. Most importantly, the possibility that there are two types of vehicle occupant that are counted as non-users adds to the complexity of the seat belt problem. In addition to the possible motivations for non-use, inconsistent users are likely to have motivational pressures that influence their seat belt use in different ways at different times. It is possible, for example, that seat belt use in inconsistent users is partly under the control of internal motivational factors and partly under the control of external factors such as the weather conditions or road type.

The second reason for focusing on this issue is related to the first. Complex seat belt related motivational factors are likely to have an effect on the acceptability and use of seat belt reminder systems. If inconsistent users support seat belts but do not use them under certain driving conditions, the seat belt reminder system is likely to improve seat belt use (and be accepted) as it will create another positive external influence on behaviour. If inconsistent users are generally negative about seat belts but use them in some circumstances as a way, perhaps, to avoid punishment, then the addition of a reminder system may be less acceptable.

It is, therefore, important to collect data on seat belt use patterns and motivations to try to understand the nature of non-use. The distinction between consistent non-users and inconsistent users is an important one, and the motivational differences between these groups are likely to impact on the acceptability of the reminder system.

Situational factors were also considered important for this study. It was noted above that some situational variables have been shown to be associated with seat belt use. This supports the notion that there are inconsistent users whose seat belt use is determined, in part, by the driving situation in which they find themselves. The seat belt reminder system is, in a sense, another feature of the driving context or situation that would be expected to have an impact on seat belt wearing. For this reason, it was considered important to incorporate an assessment of the situational factors associated with seat belt use.

Some studies have investigated the relationship between seat belt use and attitudes towards seat belts, but most of these were conducted in the United States and have limited relevance to Australian or Swedish seat belt use. This led to some interest in attitudes towards seat belts and their impact on seat belt use and the acceptability of the proposed seat belt reminder system.

Finally, the small literature on acceptability suggested that this concept was a complex one, and that some aspects of the technology's functioning (such as its dependability) were important issues for users. It was expected that this would be apparent in the results of this study.

CHAPTER 3: THEORETICAL CONSIDERATIONS

A. THE ROLE OF THEORY

The application of psychological and social theory to road-safety related behaviours, while not new, remains largely unexplored. This is particularly so in the context of recent developments in psychological knowledge and theory, where recent developments in cognitive psychology (or information processing) and in decision-making hold considerable potential for application in both road safety and the broader injury prevention area.

In the case of seat belt use, a number of psychological and social theories may help explain the underlying processes that lead to use or non-use. Theory, where supported empirically, provides important information to road safety practitioners. In particular, our understanding of the psychological and social processes that affect seat belt decisions will have an important influence on measures used to increase the level of seat belt use.

In the present context, an examination of the processes that might underlie seat belt behaviours is important for two reasons:

- These processes would be expected to impact on the effect of the reminder system technology on behaviour. If the processes are largely automated, for example, then this would have implications for the technology that may not be apparent if the processes are conscious.

- The method used to assess the likely effect of the reminder system technology depends on a clear understanding of the psychological and social processes likely to underlie seat belt use. The method needs to draw on the processes that lead to seat belt behaviours, but in the context of the introduction of a new technology.

Seat belt behaviours – like other behaviours – are likely to be influenced by a broad range of internal and external factors. The difficulty in the psychological domain is that there are many alternative conceptualisations of the way in which these factors influence behaviour and the mechanisms underlying their influence. The fact that men are less likely to use seat belts than women, for example, can be explained in terms of a number of psychological and social theories or models of behaviour. Each explanation may be consistent with the limited data in this area, and each may be consistent with the use of that theory or model in other areas. It is possible that each model may, in part, contain an element of truth in its formulation.

This adds a level of complexity to the task of understanding the likely effects of the reminder system technology. In the absence of some unified theory or model of driving behaviour, there is a need either to select the most appropriate model(s) for the particular purpose here, or to attempt to synergise diverse accounts of seat belt behaviour. A middle path was chosen for this project, after an initial review (below) of how various models and theories might be applied to the seat belt use issue.

It was clear that there has been very little effort undertaken to apply the various psychological and social models and theories to seat belt behaviours. As long ago as 1988, Nelson and Moffit cautioned that the integrity and effectiveness of public education on seat belt use was threatened by the lack of a theoretical foundation. They argued that effective health promotion would require an understanding of the epidemiology of motor vehicle injuries including an

understanding of behavioural antecedents and their motivational role. These included predisposing factors, those that provide motivation for behaviour (knowledge, attitudes, beliefs, and values), enabling factors, those that allow motivations to be realised (skills), and reinforcing factors, those that provide motivation to continue behaviour (incentives) (Green, Kreuter, Deeds, & Partridge, 1980). Nelson and Moffit reviewed six theoretical models in relation to seat belt use, namely: Theory of Reasoned Action, Health Belief Model, Fear Arousal, Operant Learning, Social Learning Theory, and Diffusion of Innovations. The present review discusses the more-promising theoretical formulations presented by Nelson and Moffit, describing each model and incorporating more-recent theory and research findings. It then departs from Nelson and Moffit's structure and describes an alternative view of seat belt use.

B. PSYCHOLOGICAL CONSIDERATIONS

Theory of Planned Behaviour

The Theory of Reasoned Action (TRA) or Behavioural Intentions Model of Fishbein and Ajzen (1975) proposes that people behave the way they intend to behave, and that personal and societal beliefs about a behaviour influence behavioural intent. The notion that behavioural intent is a key predictor of behaviour has been taken up in the road safety area by a number of authors, although a more recent formulation of the theory (the Theory of Planned Behaviour or TPB – Ajzen, 1985, 1989) is more appropriately discussed here.

The TPB has been applied most recently to road safety issues by Forward (1997), Stradling & Parker (1997), and Vaya, Gimeno, & Centelles (1997). Forward (1997) was concerned with issues relating to the measurement of attitudes within the context of the TPB. Stradling and Parker (1997) attempted to apply the TPB to driving violations in general, and used examples in the speeding, drink-driving, traffic signal, and overtaking domains in their study. Vaya et al. (1997) were concerned with drink-driving.

The application of TPB to seat belt use is shown in Figure 2 (adapted from Ajzen, 1989).

The TPB argues that behaviour is ultimately the result of beliefs about the behaviour, beliefs about society's view of the behaviour, and beliefs about the extent to which the behaviour is under internal or external control. With the possible exception of external control, it is argued that these beliefs act through the intention to behave in a particular way, which is available to assessment via questionnaires and discussion.

In the seat belt domain, this suggests that beliefs about seat belt use, about society's attitude towards seat belts, and beliefs about personal control over seat belt use act to determine the behavioural intention concerning seat belt use which in turn drives seat belt use. Such a theoretical approach leads to clear recommendations about appropriate measures to increase seat belt use (e.g. a program suggested for Sweden by Fhaner and Hane (1974)).

The TPB and the TRA have met with mixed success in road safety. Aspects of the TRA and the TPB have been shown to predict a number of unsafe road use behaviours such as drink driving (Åberg, 1993) and a number of other behaviours (Parker, Manstead, Stradling, & Reason, 1992) including seat belt non-use (Budd, North, & Spencer, 1984; Stasson & Fishbein, 1990; Wittenbraker et al., 1983).

The ambivalent evidence in relation to the causal relationship between attitude and behaviour (a key assumption of the TPB) in driver behaviour (e.g. Rothengatter, 1994, cited in Forward, 1997) and some other problematic results (Forward, 1997) suggest that the TPB may not be entirely appropriate in the road safety context.

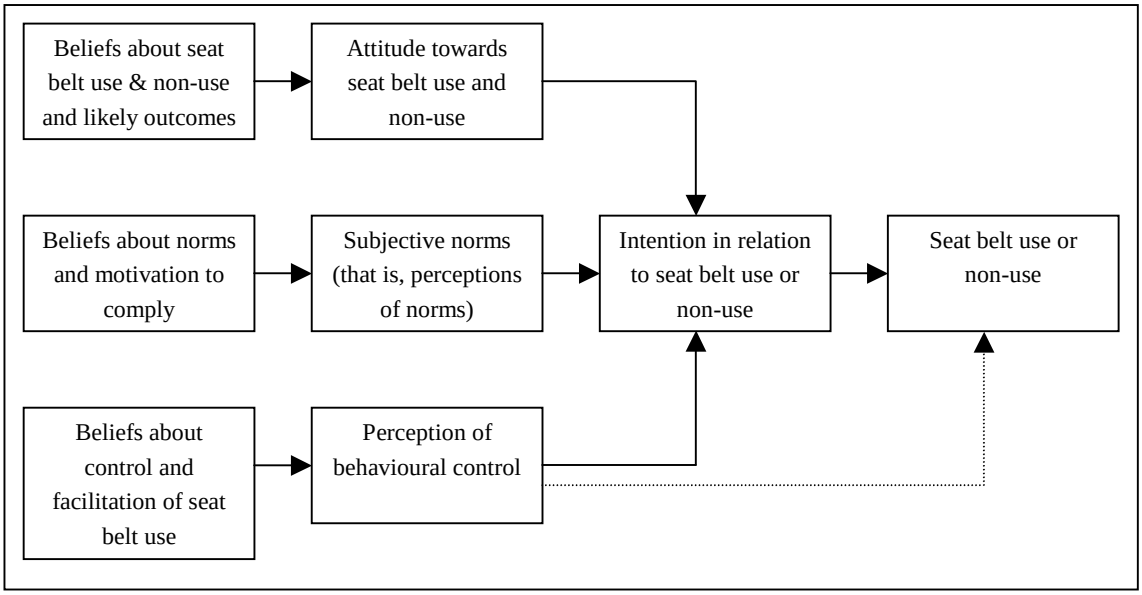

Figure 2: Application of the Theory of Planned Behaviour to Seat Belt Use (based on Azjen, 1989)

The TPB does not easily take into account the effect of prior behaviour or habit. Budd et al (1984) found that adding a factor to reflect prior use of seat belts significantly improved the TRA model while the motivation to comply component did not significantly add to the model's predictive power. Thuen and Rise (1994) found prior use of seat belts was the single most powerful predictor of intention, also finding a better fit of the model for females than males. The application of the TPB to seat belt use, therefore, would require the addition of components to the theory to take into account habitual or automatic behaviours that may have developed as a result of beliefs and intention but which now may occur because of some automatic process (see below).

Rational Decision-Making Models

A number of models of behavioural decision-making may have some application to road safety in the broader sense and to seat belt use in particular. Rational decision-making models view the decision maker as attempting to make decisions about his or her behaviour based on the expected outcomes of different alternative behaviours. These models share a view that human behaviour attempts to be optimal in any given situation (given the decision-maker's motivational state at the time), and that the decision-making process uses expected outcomes to determine the best behaviour in that situation.

Rational decision-making models have been a fundamental part of the deterrence model as it relates to drink-driving (Homel, 1988; South, 1998). In this context, the Subjective Expected Utility theory is often applied, assuming that drivers make decisions about drinking and driving

based on their expectations about potential outcomes of alternative transport arrangements and the value given to each by the driver.

The rational decision-making models have found particular acceptance in the deterrence area as they allow for the behavioural effect of the perceived risk of detection for a driving offence. Detection and punishment are viewed as a potential negative outcome for illegal behaviours, just as perceptions of crashing might be viewed by drivers as potential negative outcomes for unsafe driving behaviour.

A rational decision-making approach applied to seat belt use would see the decision to use a seat belt as the result of a process that weighs the potential outcomes of the two alternative behaviours (use or non-use). A decision not to use the seat belt would presumably result when the driver sees that there are more-positive consequences in non-use or more-negative consequences in use of the seat belt. Figure 3 shows how a rational decision-making model might be adapted to the seat belt issue.

Harrison (1998, 1999) has discussed the rational decision-making models in relation to drink driving and speeding and concluded that it is very unlikely that this type of model is appropriate for understanding driver behaviour. He argued that naturalistic decision-making models (see below) are more appropriate as they incorporate a role for experience and automaticity in behavioural decisions.

One rational decision model worth discussion is the Health Belief Model (HBM; Becker & Rosenstock, 1978) as it is clearly relevant to seat belt use. This model proposes that the probability of adopting a preventative health action is primarily determined by the perceived threat of not adopting that action. The perceived threat is influenced by individual beliefs including the perceived level of susceptibility to the health threat (perceived risk), and the perceived degree of severity of the threat. A cue-to-action factor is also incorporated, indicating that awareness of the perceived threat can be triggered by particular cues that may lead to action.

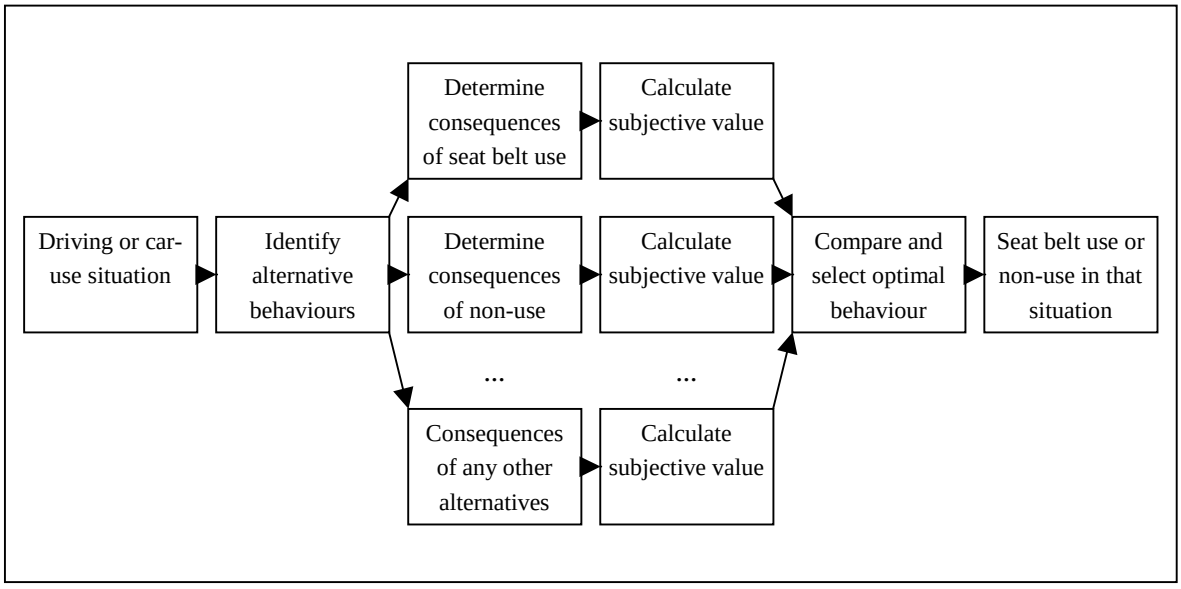

Figure 3: Adaptation of the Subjective Expected Utility Model to Seat Belt Use

It is clear that the HBM is a rational decision-making model, where choices about behaviours are determined by an assessment of the potential health effects of alternative behaviours. The potential negative outcomes of non-use that might be expected to influence the decision to wear a seat belt include not only the outcomes of crash involvement, but also enforcement outcomes, and social appraisals (Nelson & Moffit, 1988).

Since the original development of the model (Becker, 1974; Rosenstock, 1974), Becker, Kasal, Kirscht, Maiman, and Rosenstock (1977) have included a general health motivation dimension in the HBM. That is, individual motivations towards positive health actions in general also need to be considered when assessing motivations for seat belt use. This is supported by research discussed above (Donohue, 1988; Eiser et al., 1979; Hijar et al., 1998; Reinfurt et al., 1996; Williams & Wells, 1993; Wilson, 1990). This development of the HBM adds an element of the perceived value of different outcomes to the model, making it more similar to the Subjective Expected Utility model discussed above.

The focus on the perceived threat of negative outcomes in the HBM is problematic. Slovic, Fischhoff, and Lichtenstein (1978) have argued that protective behaviour is influenced more by the probability of hazard than by the magnitude of its consequences, and that people are not inclined to protect themselves against very low probability threats. Summala and Näätänen (Summala, 1988; Summala & Näätänen, 1988) have argued that drivers' perceptions of risk are generally very low while driving.

Summala and Näätänen's view is that driving is a habitual, largely automated behaviour in which drivers learn to adapt to traffic demands. Each successful trip reinforces the belief that their driving behaviour is safe. Consequently, the driver's view of the level of risk to them while they are driving is likely to be very low, suggesting that this perceived risk may not be a strong-enough motivator for seat belt use under the HBM.

The HBM, of course, is also subject to the criticisms of rational decision-making models made by Harrison (1998, 1999), and is therefore unlikely to be an appropriate model to apply to seat belt use.

Fear Arousal

At a more-basic psychological level, seat belt use may be a response to fear. This view would argue that wearing a seat belt is a fear-reduction or anxiety-reduction behaviour. Non-users, under this view, would be less fearful or better able to cope with fear.

Since the late 1960s, several theories of promoting preventative health behaviour using fear have been explored. These have included fear as a threat communication (Higbee, 1969; McGuire, 1969; Leventhal, 1970), as a motivational construct (Beck & Frankel, 1981; Leventhal, 1971), in relation to personality characteristics (Loo, 1984; Russell, Bulloci, & Corenblum, 1977), and in relation to cognitive variables (Sutton, 1984). Research has focused on responses to fear arousal messages, the most effective level of fear, and recipient and situational variables affecting the persuasiveness of the fear communication.

Nelson and Moffit identified the most common theoretical assumptions as first, that fear messages will cause anxiety and a desire to control the danger and second, that the desired behaviour will only occur if it is perceived to reduce the threat. There is evidence that moderate to high levels of fear arousal have maximised seat belt wearing (e.g. Berkowitz & Cottingham, 1960; Loo, 1984; Moffit & Nelson, 1986; Sutton, 1992).

There are two ways to account for the effect of fear. One view might be that fear or anxiety in the context of driving without a seat belt acts directly on behaviour, forcing the car occupant to modify their behaviour to reduce the level of fear arousal. The ability of fear to evoke this direct behavioural response is well accepted, and there is ample evidence that many quite complex avoidance behaviours can be evoked in lower mammals using fear-reduction as a motivator. This interpretation of the effect of fear views seat belt use as an instrumental or learned behaviour, evoked by the driving context, and reinforced by the fear or anxiety reduction that follows. For this to occur there would need to have been some experience that evoked fear in the context of non-use. Whether this necessarily involves an actual experience or an imagined experience mediated by the experiences of others or media material is probably unimportant. Application of this model to seat belt use is shown in Figure 4.

The model in Figure 4 is in two components. In the first component, there is some fear evoking experience associated with non-use. Subsequently, non-use evokes a similar fear response that results in seat belt use as a fear-reduction behaviour. Subsequently the use of seat belts becomes a fear avoidance behaviour without non-use having to evoke a fear reaction.

An alternative view is that fear signifies a potential negative outcome for the occupant and is incorporated into the decision-making process. This approach relies less on the instinctive ability of fear to evoke behaviour directly and more on fear as a cue for negative outcomes.

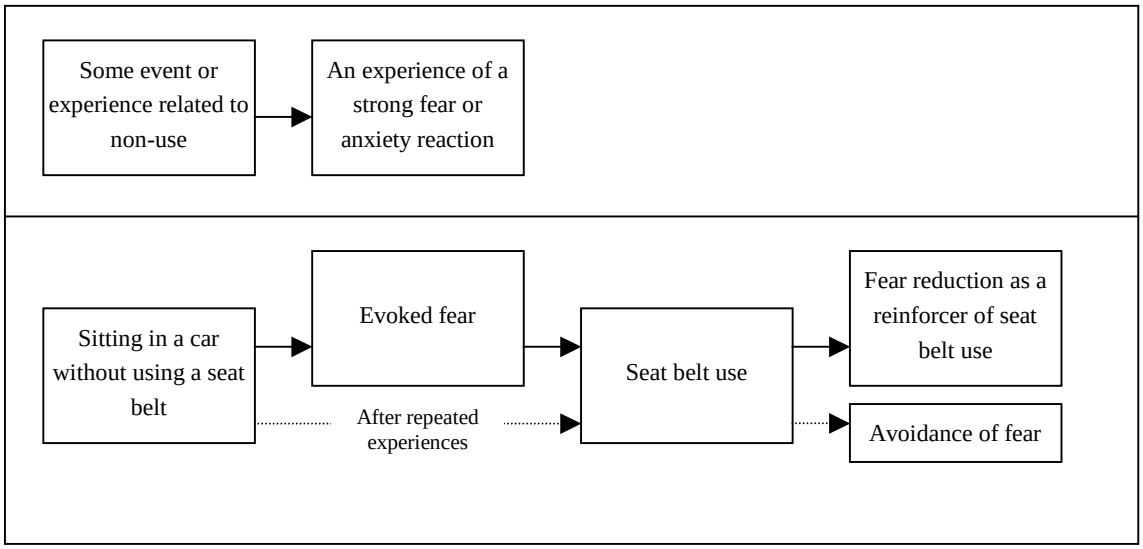

Figure 4: Application of a Fear Reduction Model to Seat Belt Use

Explaining seat belt use as a result of fear-reduction relies on the driver's perception of fear in the driving situation. The zero-risk arguments of Summala may represent a problem here (Summala, 1988; Summala & Näätänen, 1988). It needs to be noted (and of relevance to the above discussion on the HBM) that the zero risk discussed by Summala is more-appropriately viewed as the level at which drivers choose to drive. Under the zero-risk model, drivers adjust their driving behaviour so they perceive there to be no risk. Thus, they do not drive dangerously and perceive no risk, rather they vary their driving to create no or a low perceived risk. Use of a seat belt may be one method of reducing the perceived risks associated with driving to low levels, and this "risk-reduction" may be an interesting example of the fear-reduction motivation applied to road users.

Social Processes

The involvement of social processes in behaviour was implicit in the Theory of Planned Behaviour outlined earlier, but it is clear that social influences can affect seat belt use in more direct and substantial ways than implied in that model. While it is not proposed here to focus on one particular model of social processes that might explain seat belt use, it is important to draw out some important aspects of social models and theories that might be relevant for seat belt use.

Perceptions of the behaviour, attitudes, and values of others are known to influence behaviour in general (see the substantial review of social influence by Cialdini & Trost, 1998), and have been demonstrated to influence aspects of driver behaviour (e.g. Evans & Wasielewski, 1983; Harrison, Fitzgerald, Pronk, & Fildes, 1998; Jackson & Gray, 1976; Wasielewski, 1984). Seat belt use is likely, in a similar way, to be under partial control of social factors which, in broad terms, may be viewed as important situational factors.

Social factors that might be considered important for seat belt use include the following:

- Modelling: Drivers are known to model their speed choice on their perceptions of the speed behaviours of other drivers (Harrison et al., 1998). It would be surprising if seat belt use was not influenced by the perceived behaviour of others in the occupant's environment. No research on this issue was found in the review conducted for this project. It might be expected, for example, that occupants would be more likely to use a seat belt if the driver uses one.

- Social Norms: In addition to the largely local effect of modelling, there is clear evidence from a number of areas that perceptions of normative behaviour influence the behaviour of individuals (Cialdini & Trost, 1998). It would be expected, therefore, that the perception of normative seat belt behaviours would influence the seat belt use of individual road users. Here, it might be expected that road users with a belief or perception that seat belt use is widespread would be more likely to use a seat belt.

- Social Learning: Social learning theory (Bandura, 1977) argues that behaviour can develop through the observation of others' behaviour in particular contexts, so that the recalled behaviour serves as a model for behaviour in the same context. In the seat belt domain, observation of the seat belt use patterns of other road users, perhaps while young, may lead to the development of behaviours that are then evoked when similar situations arise. Nelson and Moffit (1988) suggested a seat belt program based on social learning theory.

- Peer Pressure: The effects of peers on driving behaviour has been noted (Wasielewski, 1984), and similar effects might be expected for seat belt use. The effect of peers on driving behaviour is probably best understood as a combination of the effect of modelling and the perceived social norms of the peer group.

Habitual Behaviours

Harrison's (1998, 1999) criticism of the application of rational decision-making models to driver behaviour was noted above. Harrison proposed that so-called naturalistic decision-making models were more promising in the driver-behaviour area.

Klein's (1989, 1993) Recognition Primed Decision (RPD) model provides an example of the potential value of this type of model. The RPD model argues that decision-making relies on recognition of a situation and the generation of behaviours that have been used successfully in that situation before. The RPD model fits well with models of behavioural automaticity (e.g Logan, 1988) which attempt to account for the development of automatic or habitual behaviours that occur in specific contexts. It is not the intention here to describe these models in detail, but rather to draw on them as potential ways to understand seat belt use and non-use.

This approach is based strongly on an assumption that behaviours are often responses to situational variables or cues. The models discussed above share an emphasis on the internal generation of behaviour – on the notion that the vehicle occupant directs his or her behaviour in some way. The alternative is that seat belt use is a habitual behaviour mostly under the control of situational variables and less under the control of the driver or occupant. While such a view runs against many of the assumptions implicit in road safety programs, it is consistent with the general understanding of behaviour. In the context of high-workload activities such as driving, where there is a need to attend to many things in the environment, the information processing system is designed to develop habits based on experience and situational factors.

Figure 5 shows how the RPD model might be applied to seat belt use, in combination with the Instance Theory of automaticity.

The repeated experience of using a seat belt while in a motor vehicle results in an automated process that involves recognition of the situation, the retrieval of any common behaviours in that situation (e.g. wearing a seat belt), assessment of whether the behaviour is satisfactory in that particular context, and then the generation of the behaviour. The model has received empirical support in general (e.g. Klein, 1998), and is increasingly being applied in the driving domain (e.g. Harrison, 1998, 1999).

The seat belt user, under this view, has developed a habitual behaviour cued by sitting in the car or by some other aspect of driving. The non-user either has failed to develop the same habit, or (less likely) has developed a habit of non-use. The inconsistent user may have their habitual seat belt behaviour cued in some driving situations but not in others. The potential of this viewpoint is clear as it provides a simple explanation of variations in seat belt use.

This approach does not specify how seat belt use develops initially. This most likely relies on some combination of the influences outlined above. It does suggest, though, that the seatbelt use or non-use habit is likely to strengthen with time and experience, and that behavioural or educational programs designed to change the behaviour of non-users are likely to have only limited success unless they can encourage consistent seat belt use for long enough to result in the development of a habitual behaviour that responds to driving-related cues. Reminder systems might be a useful measure here.

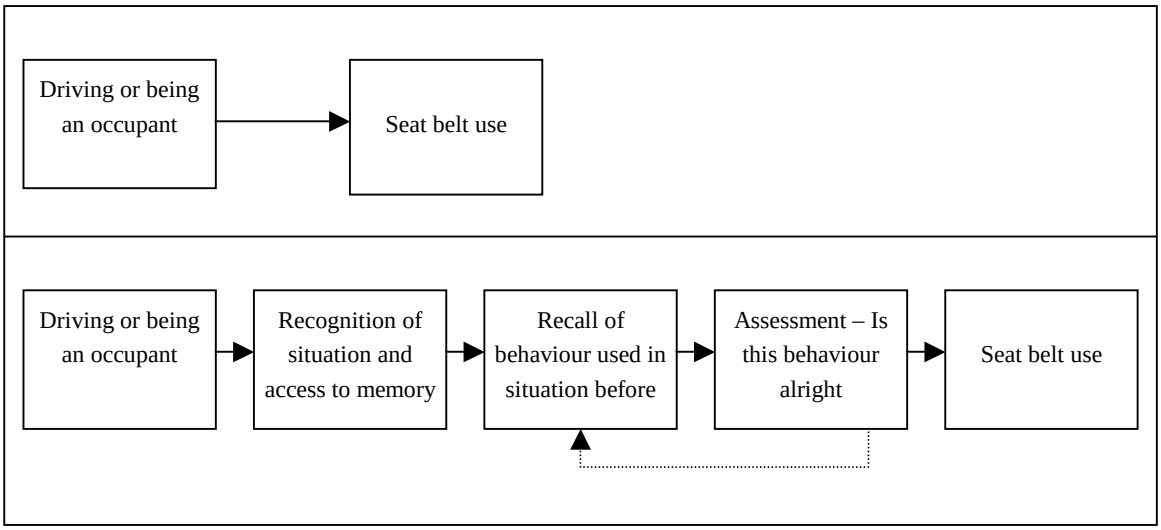

Figure 5: Application of the RPD Model to Seat Belt Use

C. INCONSISTENT USERS

The likelihood that seat belt use is not consistent amongst all road users was discussed earlier. It is likely that there are three groups of road users – consistent users, inconsistent users, and non-users. The motivational factors underlying the behaviour of each group, and the causal factors associated with seat belt use in each are likely to be different. This is an important point, and is particularly so in the context of measures implemented to increase the level of seat belt use.

The role of situational variables in seat belt use was emphasised in the results of a small survey of non-users identified on the road (and therefore likely to include inconsistent users) (Turbell & Larsson, 1999). The drivers were asked why they did not wear a seat belt on that particular trip. The responses (e.g. short trip, carelessness, forgetfulness, stressed, in a hurry) suggested that respondents were influenced by external or situational factors in addition to internal factors such as their attitudes and beliefs.

The importance of situational variables in seat belt use is consistent with the possibility that there are three groups of road users, and the results of Turbell and Larsson's survey suggest that the inconsistent user group may be large. They found that only 7.6% of their sample gave responses that suggested they might be non-users rather than inconsistent users. If inconsistent seat belt users are a large proportion of non-users in road-side surveys and crashes, and if situational variables appear to play an important part in decisions to use a seat belt, it follows that the most appropriate models for understanding seat belt use are most likely those that allow situational factors to have a strong impact on seat belt use.

The complexity here is that this might only apply in the case of inconsistent users. Consistent users may do so because of internal motivating factors rather than the action of situational variables. It is possible that consistent users and non-users are responding to internal influences, and that inconsistent users are responding to situational influences. This presents a

difficult problem for the development and implementation of seat belt use programs, and presents a more complicated problem in the present context where there is a need to understand how non-users and inconsistent users will respond to the new reminder system technology.

One clear conclusion is that it is important to consider both internal and external causal factors in the development of an assessment method undertaken for this project.

D. SUMMARY OF KEY POINTS

At this point, it was considered important to emphasise some issues that are directly relevant to the current project, before discussing the methodological issues that confronted the development of an assessment method.

- Seat belt use appears to be the result of a number of internal (psychological) factors and external (situational) factors. The interaction between these is most likely an added complexity that needs to be addressed.

- The effects of both internal and external factors on seat belt use and their likely effect on the introduction of seat belt reminder systems needs to be considered. The successful introduction of the reminder system technology depends (in part) on understanding and taking into account the potential negative reactions of some road users in some situations.

- The most useful models for understanding both seat belt use and the likely impact of the reminder systems are considered to be the fear-reduction model, the naturalistic decision-making model (the RPD), and the social influences discussed above. It is thought that the fear-reduction and RPD models provide important information about the effect of situational and motivational factors on seat belt behaviours, and that they both emphasise the automatic or habitual nature of seat belt behaviours. The social influences provide an understanding of the development of motivational influences and emphasise the importance of the social and cultural context in which behaviours occur. A focus on these models is largely consistent with the general model of reminder system effects initially discussed in the Overview section (see page 3). The three models were used as the basis for development of the method discussed in the remainder of this report.

The importance of psychological models of behaviour has been emphasised here. The complex interactions between environment and behaviour rely on psychological processes. Understanding the effect of a new measure (the seat belt reminder system) is likely to be easier if its effect is considered in the broader context of a general understanding of the psychological processes underlying seat belt behaviours. Further, a broad understanding of these processes may help the development of measures to improve the acceptance of the new technologies. For example, if seat belt behaviours are habitual in particular contexts, as might be suggested by the RPD model, then communication of this idea through appropriate media material might help drivers to understand the reason for introducing the seat belt reminder system.

CHAPTER 4: DEVELOPMENT OF THE ASSESSMENT METHOD

This Chapter describes the method developed to assess the likely reaction of drivers to the seat belt reminder system. The development of an assessment method was complicated by a number of factors, including the following:

- The technology is currently unavailable in Australian motor vehicles. This meant that any assessment method had to rely on indirect methods that could be applied without access to the technology. Although challenging, this was considered an important feature of the method. There is often a need to predict reactions to technologies before they are widely available. The development and successful introduction of such technologies may rely on accurate predictions of user responses, and the current development of ITS technologies emphasises the need for a method to assess reactions as part of the development process. Thus, the method developed here was designed to be used ahead of any formal trial of the actual technology.

- A trial of the technology may be more appropriate. Although such trials are essential, their use is more-appropriately limited to human-factors and ergonomics issues rather than acceptability and user response. The use of volunteer users in trials is likely to bias the results towards people interested in new technologies and away from people whose reactions may be less positive. The assessment technique here was designed to broaden the involvement to people who might not normally volunteer to take part in a longer term trial but who would still be expected to come into contact with the seat belt reminder systems as they become widely available. This does not remove, however, the need for adequate trials of the reminder systems with real users as contact with the technology may change people's reactions to it.

- Assessment methods need to focus on potential target groups. ITS technologies are designed, in part, to provide road safety benefits by modifying the behaviour of at-risk road users. Seat belt reminder systems are designed, for example, to modify the behaviour of people who are either inconsistent users or consistent non-users. The response of these groups of road-users is more important for the success of the technology than the response of other road users (as a general rule, although a widespread negative reaction may impact on the effectiveness of the reminder systems amongst the target group of road users). Thus, it would be appropriate to bias an assessment technique towards members of the target group of road users.

The method developed here was designed to assess likely responses to the seat belt reminder systems (and other ITS technologies) without requiring access to the technology, and in a way that included a broad range of people who were the likely targets for the technology.

This section of the report details a number of key issues that were considered in the development of the technology, the place of social processes in reactions to technology and in the current method, and a description of the assessment method.

A. KEY ISSUES

The development of a method to assess the effect of the introduction of reminder systems (and other) technologies was a challenging task. Some initial consideration led to the development of some minimal requirements for the assessment method. Assuming the use of a sample of consistent non-users and inconsistent users as participants, these requirements include the following:

- The current seat-belt related behaviour and motivations of the sample of individual drivers (and passengers) would need to be assessed prior to any discussion of reminder systems, in addition to any characteristics that might be recognised as factors influencing seatbelt use.

- The reminder system technology would need to be discussed with participants so they have a detailed functional (rather than technological) understanding, although there will be some participants who might need additional technical information.

- The potential effects of social influences on behaviour would need to be incorporated into the assessment process.

- Participants would need to provide data concerning their behavioural intentions and any likely changes in underlying motivations would need to be assessed.

- The method would need to be developed in such a way that it could be used in Sweden and (potentially) other jurisdictions where there are likely to be cultural and social differences.

- The method would need to be developed in such a way that other research teams will be able to utilise it fully.

- The method would need to allow the assessment of alternative approaches to the reminder system technology in addition to assessing the response of drivers to the general technology. Thus, it is considered that there is a need for the method to be used to assess such things as the nature of the warnings communicated by the system.

- The method would need to be applicable to other technological and systems advances.

B. SOCIAL INFLUENCES AND DECISION-MAKING

One important feature of driving behaviour and safety-related behaviours is the importance of social influences. Social factors also have a broader influence on behaviour, and it was considered important to develop a method that would allow social influences to play a role in the reaction of drivers to the seat belt reminder system. It would have been straightforward, for example, to conduct a simple face-to-face or telephone survey incorporating items designed to assess predicted responses to the seat belt reminder system. This would have ignored the complexity of behaviour, however, and would have failed to allow social processes to act on individual opinions and responses, as they ultimately will when the reminder systems are widely available.

Thus, the method developed here was designed to encourage social processes to occur and to allow them to influence the opinions of individuals. While it was recognised that this may allow individual reactions to the technology to be changed by strong social influences, it needs

to be recognised that the reaction of people to the technology as it becomes widely available is likely to be influenced (and potentially changed) as a result of interactions with stronger social influences. Allowing this to occur most likely reflects the actual processes that will occur when the reminder systems become available. It was considered important, however, to assess the reaction of individuals to the technology before allowing the social processes to occur.

Social processes influence the decision-making process that is likely to drive the reaction of drivers to the seat belt reminder system. The decision-making process is also likely to be influenced by motivational and experiential factors in relation to seat belt use and more-general driving behaviour. It was therefore considered important to assess motivational and experiential (or behavioural) aspects of seat belt use and wider driving behaviour as part of the assessment method, but to do so in a way that measured these influences before allowing the social processes to occur and before participants had contact with the technology. Measuring these factors in this way recognises that these factors form the background or context of any reactions to the seat belt reminder system.

C. SIMULATION OF SOCIAL PROCESSES

The assessment method had to measure people's reactions to the technology within the context of social processes relating to it. A decision was taken to give some emphasis to the social processes and to try to create an assessment method that simulated the social interactions that were likely to occur when the seat belt reminder systems are introduced.

The main consequence of this is that the recommended assessment method was based on the simulation of social processes in a group-discussion format. Group discussions can take a number of forms, ranging from unstructured discussions with a high level of social interaction but little direction through to highly structured discussions where there is substantial direction and little social interaction.

Unstructured discussions provide opportunity for social processes to occur, but are unlikely to provide information about the specific issues of relevance to the study and are likely to lose focus as the discussion follows its own path. A highly-structured group discussion is less likely to lose focus, is more likely to address the relevant issues, but is unlikely to allow the usual social influences to impact on the opinions and behaviours of group members.

In this study, it was considered essential to allow social influences to occur, but it was also considered important to keep the discussion focused on the issues relevant to the study. Thus a compromise method was developed that allowed interaction between participants and social influences to occur, but which also provided guidance concerning the focus of the discussion. While such a method controls some aspects of the social processes that might occur with the introduction of the new technologies, it was considered important to encourage the group discussions to consider a specific set of issues that would potentially influence their own reactions to the technology.

Thus, the assessment method was designed to provide information about the new technology, collect information about the reactions of people to the technology, allow social processes to influence opinions and the direction of discussion, and to collect final information about how people would behave in the presence of the technology.

D. THE ASSESSMENT METHOD

The assessment method was developed and piloted in 1999. It is not intended here to report the piloting formally, but aspects of this process are discussed as needed.

Outline

The assessment method was based on a group discussion designed to simulate some of the social processes thought to influence drivers' reactions to new technology. The main aim of this approach was to give participants information about the technology and then to allow them to develop an opinion based on their knowledge, their own experiences, and the social interaction that occurs in the discussion group.

Recruitment

Recruitment involved a random-number telephone survey to measure aspects of seatbelt use and other road-safety attitudes and behaviours, followed by selective recruitment of participants (with defined characteristics – see below) into the discussion groups.

A number of recruitment methods were considered, assuming that the discussion groups would preferably include participants who were less likely to use their seat belts all the time. Methods considered included the following:

- It would be possible to use records held by enforcement or licensing authorities to select potential respondents. These records (in Victoria) include information about seat belt offences. It would be possible to extract contact details (name and address at the time of the offence, but not telephone number) and then to mail out recruitment letters to potential participants. This method was not selected for three reasons. This recruitment method would most-likely bias the sample towards people who drive more often than others as these people would have a greater risk of detection for seat belt offences as a direct result of their driving exposure. The potential bias would extend to the type of offence and offender. It is likely that consistent non-users would have a greater chance of inclusion in the study using this recruitment method than would inconsistent users. It was also considered that using Police records to identify potential offenders might be less acceptable from an ethical position. It was also likely that potential participants recruited in this way might be difficult to contact, as a result both of the need to use mail rather than telephone contact, and the likelihood that many potential recruits may have changed address since the offence.

- It would be possible to ask the Police to assist in the recruitment by identifying non-users and referring them to the study. This would result in the same bias problems noted above, and would most likely be ethically unacceptable because of the potential for perceptions of coercion in the recruitment.

- A road-side survey process could be used to identify non-users through observation, but the same bias issues would be a problem.

- A telephone survey could be used, based on random sampling techniques, to identify people who are less likely to wear a seat belt than others in the sample, with follow-up recruitment of potential group discussion participants. This technique is less likely to result in driving-exposure related bias in the discussion group participants, but will result

in some degree of self-selection or volunteer bias which is probably unavoidable in discussion groups. It doesn't present any of the ethical difficulties outlined above.

The last recruitment technique was selected, incorporating a random-number telephone survey, identification of potential participants (during the survey) based on their responses to selected survey items, and recruitment into the discussion groups during the survey.

The recruitment survey was developed to collect data from potential participants in a number of broad areas, and to do so in less than five minutes to encourage a positive response from potential participants. The survey was modified slightly through the pilot period.

The survey collected demographic information and responses to a series of statements targeting the respondent's attitudes and behaviours in relation to road safety and seat belt use. The final survey is presented in Appendix A. The attitude and behaviour items collected information about self-confidence or self-calibration as a driver, attitudes towards road safety, and a number of seat belt attitudes and behaviours. The need for honest responses was emphasised, as was the confidentiality of the survey. Respondents were not informed that their responses were being used as the basis for recruitment into the discussion groups.

The survey and the selection criteria for potential recruits are discussed below.

Discussion Group

The Discussion Groups were planned as a way of simulating some of the social interaction that was thought likely in the context of introducing the seat belt reminder systems as a new vehicle component, and that was thought likely to influence the attitudes and behaviours of vehicle occupants once the new device was available.

It was considered essential to reach a balance between a free, uncontrolled discussion and a question-and-answer session. Unlike a discussion in a natural environment, there was not any opportunity here to allow the discussion to follow an undefined path. Instead, a number of specific issues were identified and these were used as prompts for discussion after an introduction to the technology. The specific issues highlighted for discussion were:

- First reactions to the technology
- Immediate thoughts about getting around the technology
- Predictions about how friends will react to the technology
- Predictions about how drivers in general will react
- Feelings about how it will feel having the car interfere in behaviour
- Predictions about how the technology will affect seat belt use
- Predictions about how the technology will affect seat belt use in cars without the technology (transfer effects)
- Whether participants feel tempted to try and beat the technology
- Suggestions about how could the technology be beaten and the likely success of doing this

It was planned to guide the discussion to these issues unless the flow of discussion brought them up without involvement of the facilitator.

The Discussion Groups were planned to take 2 hours, divided into five parts:

- An Introduction and completion of a Preliminary Questionnaire: In this section of the discussion group, participants were introduced to the project in broad terms, were asked to complete an informed-consent form after reading a formal explanatory statement required by the Monash University Standing Committee on Ethics in Research on Humans, and completed an initial questionnaire (presented in Appendix B). The Preliminary Questionnaire was designed to collect detailed information about seat belt wearing in many driving situations and conditions, information concerning motivational factors that influence seat belt use and non-use, and responses to some general attitudinal and behavioural items. It also collected additional demographic information and responses to a set of items measuring the participants' responses to a seat belt reminder system. The last items were repeated in the Post-Questionnaire (see below) and were intended to measure any changes in attitudes resulting from the information and group discussion.

- Information about the Seat Belt Reminder System: The facilitator then provided a short introduction to the technology. This focused on seat belts in general, the American trials of a seat belt interlock, recent technological developments with automated seat belts in North America, the Swedish approach and its reliance on reminding occupants rather than forcing them to use their seat belts. In the pilot discussion groups, the presentation included a description of the system and its operation using flow charts and opportunity for questions. This was unsatisfactory, and the availability of a video about the seat belt reminder system (Team Forslund, 1999) for the larger trial of the method discussed in the next Chapter enabled the inclusion of a video presentation that provided a much clearer description of how the system might work.

- Group Discussion: Participants were asked for their initial reaction, and the guided discussion continued from there. Some early sessions became question and answer sessions rather than discussions, with the facilitator responding to questions and ideas as the "expert" rather than facilitating ongoing discussion about the issues. This was not surprising in the context of a new technology where participants had high levels of curiosity because the technology was likely to affect them at some stage in the future, and where the facilitator was most-likely perceived as an "expert". Later discussion groups were much less likely to have this problem as the facilitator tended to turn the discussion of more issues back to the group rather than automatically providing an answer to questions raised by the participants.

- Post-Questionnaire: After the Group Discussion, participants were then asked to complete an additional questionnaire (in Appendix C). In addition to providing opportunity for feedback about the discussion session, the Post-Questionnaire collected responses to the seat belt reminder system items used in the Preliminary Questionnaire, responses to a set of items about the participant's likely reaction to the technology, and responses to items concerning the response of others to the technology.

This format for the Discussion Groups remained intact throughout the pilot sessions and the larger trial of the method (see below). Some changes were made to encourage discussion (as noted above), and the inclusion of the video made a substantial difference to the quality of the discussion.

Pilot of Method

A small pilot of the method was conducted to ensure the recruitment survey and discussion-group format were effective, and to calculate a selection criterion to use as the basis for attempting to recruit survey participants into the discussion groups.

The pilot of the recruitment survey was undertaken over two weeks, with telephone surveys conducted by a team of research assistants during the early evening and night. Over the duration of the survey, analyses of the data were used to select items that differentiated between consistent restraint users and others. The subset of items used for this purpose was refined over the pilot period. The final criterion for recruitment into the survey is discussed below.

The pilot survey involved a random-number telephone survey of 170 drivers (97 females and 73 males). The average age of participants in the pilot survey was 44.6 years. Participants drove an average of 11.3 hours per week, the majority of it (82%) in daylight hours. Participants in the survey were recruited from the suburban areas of Melbourne surrounding Monash University, within a radius of about 10 km. This region includes wealthy and poorer suburbs.

If participants met a calculated criterion based on items in the survey, the interviewer asked them to take part in future discussion groups on new seat belt technologies. An offer of payment was made (AUD50 or about SEK250).

One purpose of the pilot was to develop a criterion based on the data collected from pilot telephone survey participants. The small number of participants in the telephone survey made this task difficult. A cluster analysis[2] was conducted (in spite of the small sample size) to identify a potential subgroup of participants who were less likely to wear seat belts. This analysis identified four groups of participants, one of which was significantly less likely to use restraints. This cluster included about 10% of the sample.

A discriminant analysis was then conducted using membership of this cluster as the criterion variable and the seat belt related survey items as potential predictors. This analysis was undertaken to identify the items that best predicted membership of the poor restraint use cluster.

This analysis suggested that an appropriate criterion for selecting poor users of restraints in the larger trial of the method could be calculated using the survey responses and the following condition:

[2] Using a method developed and applied in a number of MUARC studies (e.g. Harrison, Penman, & Penella, 1997), a factor analysis was used to identify underlying patterns in the responses to the seat belt related items. The factor scores were then subjected to a cluster analysis which identifies groups of respondents with similar factor scores on the five factors extracted in the factor analysis. These analyses, plus the discriminant analysis, would normally be used on larger data sets. In the present context, the analyses were conducted only to identify potential criterion items and the results were not used as the basis for further conclusions about seat belt use. The criterion was able to be evaluated in the larger trial of the method reported in a later section of the report.

Select for recruitment into the discussion groups if:	0 <	32 -0.7*[I always wear a seat belt when driving] +0.7*[I sometimes take my seat belt off before I get to my driveway] -0.6*[I feel very uncomfortable without a seat belt on] -0.6*[I always wear my seat belt when reversing the car] -0.6*[I always wear my seat belt when driving in a car park] -0.6*[Wearing a seat belt is automatic for me] -0.6*[I always wear my seat belt on short trips] +0.4*[I am generally a forgetful person] +0.8*[Wearing a seat belt is sometimes a hassle] +0.7*[Sometimes I have to remind myself to put my seat belt on] +0.6*[I sometimes forget to wear my seat belt when I am a passenger] +0.4*[One of the strongest motivations is that I might be fined]

This criterion was used in the trial of the assessment method discussed below.

The pilot was also conducted to assess the recruitment method. The recruitment survey collected data from 170 participants from a total of 300 telephone contacts with potential participants[3] (giving a refusal rate of 43%). Of these participants, 73 met the final criterion for recruitment into the discussion groups. As the criterion was developed through the pilot period, only 45 participants were asked to join discussion groups in the pilot surveys, and 19 of these agreed to take part.

There are a number of potential sources of bias in the recruitment method. The use of a random-number telephone survey (with numbers selected randomly from a telephone directory) excludes those people without telephones and those with unlisted telephone numbers (thought to be about 20% of Melbourne households). There are also self-selection biases in telephone surveys that cannot easily be controlled. The refusers may differ in various ways from those who take part in the survey.

The recruitment into discussion groups was designed to be biased towards non-users of seat belts, but it was possible that those who agreed to take part might differ from those who did not. This was investigated using the data for those who were asked to take part in the discussion groups. There were no significant differences between those who agreed and those who did not on any of the survey items including the demographic items. This suggests that this part of the recruitment process, at least, was not biased towards particular types of participants.

The pilot of the discussion group format suggested that there was a need for clearer presentation of the technology. As noted above, a video presentation was used after the pilots to provide better information to participants during the group discussions. Additionally, some changes were made to the introductory material. It was clear that the questionnaires were appropriate for the collection of the necessary data. The discussion group pilots suggested that there was a need to provide stronger follow-up of participants once they agreed to take part to minimise the effect of forgetfulness, and that there was a need to provide a range of potential discussion group times to participants.

[3] The sampling method used here involved the generation of random telephone numbers from suburbs within about 10km of the University. Telephone numbers that resulted in an engaged signal, no answer, or an answering machine were returned to the telephone number pool for re-use. When the telephone was answered, the interviewer asked to speak to the driver in the household whose birthday was next. This technique was used to reduce the bias towards members of the household who normally answer the telephone, and was expected to reduce other types of bias. The refusal rate (about 40%) is good for this type of survey and is about normal for telephone surveys conducted by MUARC.

.CHAPTER 5: OVERVIEW OF THE METHOD AND TRIAL

The key aim of this study was the development of a way of assessing the likely acceptance of seat belt reminder systems. It was important to trial the recommended method with a larger sample of participants than was used in the pilot. A full trial of the acceptability-acceptance method would ensure that the various components of the method worked well; would provide another opportunity to improve the method; and would provide Australian data on seat belt use and acceptability that would potentially be valuable here and in comparison with other countries.

This brief Chapter provides an overview of the proposed assessment method and the general method used in the trial. Chapter 6 details the results of the telephone survey used to collect initial seat belt data and to recruit participants for the discussion groups. The outcomes of the discussion groups are discussed in Chapter 7.

E. THE PROPOSED ASSESSMENT METHOD

The method proposed as the basis for assessing the likely acceptability of seat belt reminder systems was mostly the same as that reported in Chapter 4. Some superficial changes were made to the telephone survey (Appendix A has the final version); some items were added to the questionnaires used in the discussion groups (see Appendices B and C); and the discussion group format was improved with the addition of the seat belt reminder video and a shift in the emphasis of the discussion groups towards freer discussion and a stronger emphasis on interaction within the group.

Thus, the method recommended for assessing the likely reaction of vehicle occupants to the seat belt reminder system (and the method that was used in the trial discussed below) was as follows:

- Recruitment into the discussion groups was based on a random-number telephone survey using the survey in Appendix A. Telephone numbers were selected randomly from the Melbourne telephone directory from a range of suburbs. Selection of survey respondents in each household involved requesting to speak to the driver with the next birth date. The survey included a number of items concerning seat belt use and attitudes, and these were combined while the survey was in progress and participants that met the criterion in Chapter 4 were asked to take part in the discussion groups.

- The discussion group used a guided-discussion format, commencing with completion of the Preliminary Questionnaire in Appendix B, followed by an explanation of the reminder system and presentation of the Team Forslund (1999) video, the discussion itself, and ending with completion of the Post-Questionnaire in Appendix C. The purpose of the discussion was to simulate the social interaction likely to occur with the introduction of the seat belt reminder system, meaning that the style of the discussion component needed to be guided but flexible. Each discussion group was planned to take about two hours, and participants were paid for their involvement.

More-detailed discussions of the survey and the discussion groups are provided in Chapters 6 and 7 respectively, where the results of the trial are presented.

F. THE TRIAL

It was considered important to conduct a relatively large trial of the assessment method. This was primarily to assess the method and to provide information that could be used to improve it. It also offered an important opportunity to investigate both seat belt use and attitudes and acceptability issues in an Australian context. Apart from the obvious importance of this type of information in Australia, the results of the trial were considered likely to provide an important comparison for similar trials that might be conducted in other jurisdictions.

The seat belt wearing rate in Australia is generally high, and is consistently high in Victoria (the State where this research was conducted). Australian drivers appear generally to have developed strong seat belt wearing habits since the introduction of mandatory seat belt use about 30 years ago. Thus, the results of this trial conducted in Victoria provide data relevant to one extreme end of the seat belt use continuum in international terms. Sweden's seat belt usage rate is similar but slightly lower, and there are cultural differences between Sweden and Australia that might be expected to influence the responses of drivers and passengers to the reminder system. Countries in the south of Europe have relatively poor wearing rates and substantially different cultures, and both would be expected to influence responses to the reminder system.

The trial data, therefore, represent an interesting comparison point for similar investigations that may be conducted in other jurisdictions. It would be interesting to know, for example, whether the acceptability of the seat belt reminder systems is influenced by cultural differences and differences in road-safety attitudes. If it is, there may be a need to develop and target public education materials (and, perhaps, legislative controls and enforcement) when the reminder systems are introduced into some jurisdictions to ensure that their effect is positive. Similarly, if the wearing rate in a jurisdiction is related to the acceptability of the reminder system, there may be a need to use other methods to increase the acceptance of seat belts prior to the introduction of the reminder systems.

The trial was conducted by applying the method outlined above, and is reported in detail in the next two Chapters. Random number telephone surveys were conducted with over 800 participants, and discussion groups were conducted with just over 70 participants. The survey data were analysed to assess the criterion used to select potential participants for the discussion group and to investigate the factors associated with seat belt use and non-use. The discussion group survey data and the content of the discussions were used to assess the effectiveness of the method and to provide information about the likely reaction of drivers and passengers to the seat belt reminder systems.

CHAPTER 6: SURVEY OF SEAT BELT USE

The method recommended to assess the acceptability of the seat belt reminder system incorporated a telephone survey of seat belt use and attitudes, included primarily as a recruitment tool. This Chapter discusses the survey and its results as a stand-alone survey. Its use for recruitment is discussed in Chapter 7.

A. AIMS

Two key aims of the survey were:

- to identify any underlying patterns in participants' responses; and
- to identify groups of drivers who responded similarly to survey items.

While analyses were exploratory in nature, it was expected that drivers with safer driving behaviours and attitudes would be identified and would contrast with drivers reflecting poorer safety behaviours and attitudes. Of particular interest was the pattern of results for the seat belt related items.

B. METHOD

Participants

Calls were made to households in the Melbourne metropolitan area on weeknights. In order to maximise the representativeness of the sample, when contact was made, the researcher asked to speak with the driver in the household whose birth date was next. If the person was unavailable, details were recorded so that the relevant person could be called back at a convenient time, if possible. Whenever contact was made, age and sex of the respondent was requested, including after a refusal to participate in the survey.

Response rates

A pool of 3160 randomly-selected telephone numbers for private households within about 10km of Monash University[4] was generated from the Melbourne White Pages telephone directory using software developed by the first author. The software generated random page and column numbers. A clerical assistant entered the first telephone number for one of the target suburbs in the appropriate column into a Microsoft Access database, and the software then provided a new random page number and telephone number.

A total of 5472 telephone calls were initiated, of which 2383 (43.5%) resulted in contact with a potential respondent. A total of 822 drivers completed the survey on first contact and a further

[4] Suburbs included were Bentleigh, Braeside, Burwood, Caulfield, Clayton, Dandenong, Dingley, Doveton, Endeavour Hills, Forest Hill, Glen Iris, Glen Waverley, Keysborough, Knoxfield, Malvern, Moorabbin, Mt Waverley, Mulgrave, Noble Park, Rowville, Scoresby, Springvale, Vermont, & Wantirna.

132 completed the survey after call backs, resulting in a total of 954 participants. Therefore, of calls for which contact was made, the response rate was 40.0%. There was a total of 1072 refusals (45.0%), and a further 357 calls were to houses with no drivers present (15.0%).

No direct contact was made in the remaining 3089 calls. Of these, the majority (1257 or 40.7%) were unanswered calls, 651 (21.1%) were to answering machines, 529 (17.1%) were unsuccessful call backs, in 389 (12.6%) cases the number was no longer connected, and for 262 (8.5%) calls the line was engaged.

Sex and age

Of the total 954 drivers who participated, 435 (45.6%) were male and 514 (53.9%) were females. In five cases, the sex of the respondent was unidentified. Age was not disclosed by six participants. The remaining participants ranged in age from 17 years to 90 years with a mean age of 44.9 years (*SD* = 15.6 years). There was no significant difference between the age of participant males (*M* = 45.8, *SD* = 16.3) and females (*M* = 44.0, *SD* = 14.9)($F_{(1, 942)} = 3.00$, $p > .05$).

Of those that refused, 292 were male, 396 were female, and for 377 sex was unidentified. Too few recordings of age were made to compare differences.

Measures

The survey was comprised of two sections. In the first section, demographic information was obtained, including the respondent's age when getting their first driving licence and driving exposure details. Respondents were asked to estimate the average number of hours spent driving each week, and the percentage of this time spent driving in the daylight, in 60 km/h zones, and for work purposes.

In the second section, respondents' general and seat belt related road-safety beliefs and behaviours were measured using 19 items. Respondents were asked to rate the extent to which they agreed with the 19 statements on an 11-point scale (ranging from 0 to 10, where 0 = do not agree at all, 10 = agree very strongly, and 5 = agree somewhat). The majority of the items appear in Table 1. Two additional items were 'I sometimes take my seat belt off before I get into my driveway' and 'One of the strongest reasons I have for wearing a seat belt is that I might be fined'.

Procedure

Several trained research assistants conducted the telephone surveys over 18 nights during a period of five weeks. Calls were made from Monday to Thursday evenings between 5:30 pm to 8:30 pm to maximise the chances of finding potential participants at home.

The survey and file of random telephone numbers were linked together in a Microsoft Access database so that the research assistants could enter responses directly into the database. All assistants were issued with hands-free, telephone headsets for ease of data entry.

Once a suitable respondent was contacted (as explained in the *Participants* section above), the following was asked:

> Good evening. My name is XXXXXX and I am calling from the Accident Research Centre. The Centre is conducting a short telephone survey on road safety that takes less than five minutes and I was hoping to ask you a few questions.
>
> The survey is about driving and in particular about seat belts. The survey is completely voluntary and confidential. You can stop at any time. Would you be able to help us?

On agreeing to participate in the survey, the research assistant proceeded with the questions regarding demographic details, and then with the items on the general and seat belt related road-safety issues. The survey is presented in Appendix A.

C. RESULTS

Underlying Response Patterns

In order to identify any underlying patterns in responses, a factor analysis[5] was performed using the 19 items concerning general and seat belt related road-safety issues. Examination of the item distributions showed that all items were skewed, sometimes substantially, in the direction of safer road-safety responses. For example, items that expressed seat belts were always worn in the given situation were very positively skewed (with many responses approximating 10 = 'Agree very strongly'), while items indicating seat belts were a hassle or forgotten in some situations were very negatively skewed (with many responses approximating 0 = 'Do not agree at all'). Items showing some spread in responses were those comparing personal driving behaviour to that of other drivers. Examples of these distributions are displayed in Figure 6, which shows frequency distributions for four items with different degrees and directions of skewness.

While normality of variables need not be assumed for factor analysis, the procedure is sensitive to outliers, and therefore the data were screened with standard scores in excess of ±4 excluded (Coakes & Steed, 1999; Tabachnick & Fidell, 1989).

Principal Components Analysis extracted six factors with eigenvalues greater than or equal to one. Examination of the scree plot indicated that a three-factor solution was also appropriate. After the two solutions were subject to oblique rotation, the pattern matrix for the three-factor solution produced a meaningful solution with superior alpha coefficients to the six-factor solution. Therefore, the three-factor solution was deemed the most appropriate representation of the data for the present analyses. The results of the three-factor solution appear in Table 1. The solution accounted for 41.1% of the variance in responses.

[5] Where the responses to some items are correlated, it is possible that they reflect a similar psychological characteristic or type of response. Factor analysis is a statistical technique that uses the correlations between items to identify patterns of responses. It generates a set of factors, each of which summarises the responses to a number of survey items.

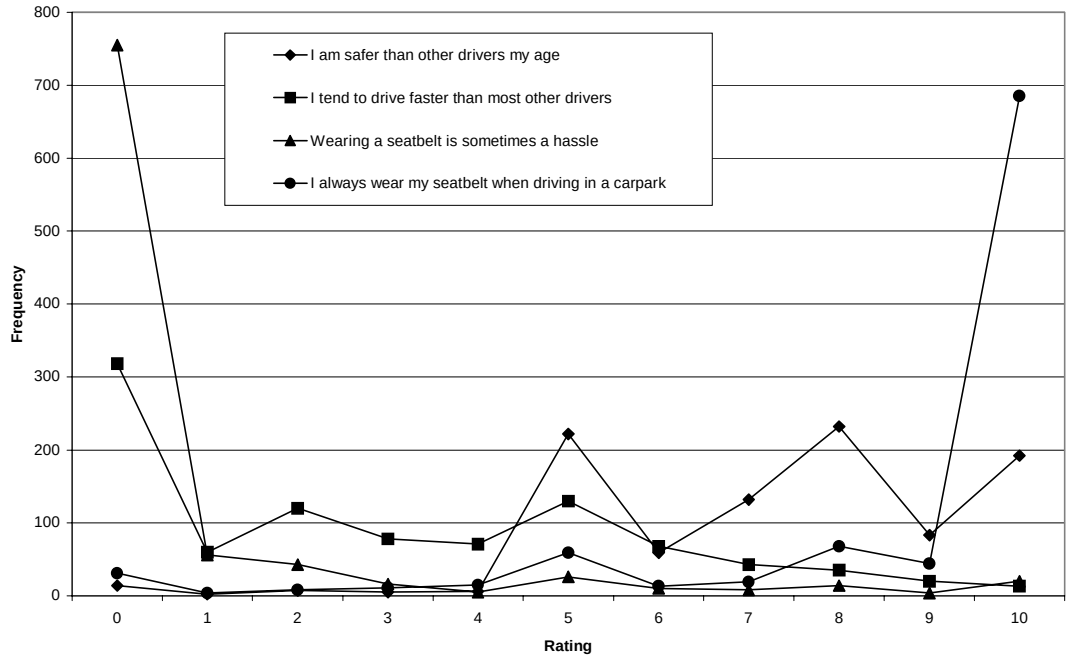

Figure 6: Frequency distributions of four items with different directions and degrees of skewness.

Table 1: Summary of three-factor solution after oblique rotation

Items	Factor		
	I	II	III
Wearing a seat belt is automatic for me	.85		
I always wear a seat belt when driving	.84		
I always wear a seat belt on short trips	.75		
Sometimes I have to remind myself to put my seat belt on	-.68		
I always wear my seat belt when driving in a carpark	.59		
Wearing a seat belt is sometimes a hassle	-.54		
I always wear my seat belt when reversing the car	.48		
I sometimes forget to wear my seat belt when I am a passenger	-.45		
I feel very uncomfortable without a seat belt on	.43		
I am a more skilful driver than other drivers my age		.84	
I am safer than other drivers my age		.82	
I am more careful than other drivers		.70	
I tend to drive faster than most other drivers			.63
It's annoying seeing children in cars without their seat belts on			-.60
It's annoying seeing other adults driving without their seat belts on		.31	-.51
Road safety is one of the most important issues in the community			-.49
I am generally a forgetful person			.33

The three factors identified in the factor analysis were as follows:

- *Factor I: Personal seat belt attitudes and behaviour* (α = .70). The first factor grouped together all items concerning the respondents' pattern of seat belt use and related attitudes. The strongest loadings on this factor were two items representing automatic seat belt use on all driving occasions. Additional items focused more on specific circumstances of and attitudes towards regular seat belt use, including comfort and convenience aspects. Therefore, high scores on this factor corresponded to regular seat belt use and positive attitudes towards personal use of seat belts.

- *Factor II: Perceptions of driving ability* (α = .78). The items loading on the second factor all related to the respondents' perceptions of their driving ability in relation to other drivers, particularly drivers of the same age. High scores on this factor indicated favourable perceptions of one's driving skill, safety, and carefulness when driving.

- *Factor III: Other driving attitudes and behaviours* (α = .39). The final factor appeared to represent other driving and road safety issues, including speed and others' use of seat belts. Also included is a general forgetfulness characteristic. Low scores on this factor indicated more positive attitudes and behaviours in regard to road safety.

Two items (listed in the *Measures* section) did not load on any of the three factors and therefore were excluded for further analyses.

Types of respondents

The next aim was to identify groups of individuals with similar responses to the road-safety items, as represented by scores on the three factors. A cluster analysis[6] was performed using standardised factor scores as clustering variables. The use of standardised scores has been recommended to remove arbitrary effects and to allow each variable to contribute equally to the solution (Everitt, 1993; Romesburg, 1984). Some items (e.g. 'I tend to drive faster than most other drivers') were reverse-coded so that for all items a higher score corresponded to a more positive response in terms of safety. A two-step clustering approach was applied.

In the first step, initial clusters were generated according to Ward's hierarchical method using squared Euclidean distance as the similarity-dissimilarity measure. Ward's method was chosen as it is widely regarded as providing the optimal or near optimal solution (Milligan, 1981; Morey, Blashfield, & Skinner, 1983; Overall, Gibson, & Novy, 1993; Romesburg, 1984). Squared Euclidean distance was chosen as it is the most widely used and recommended measure of similarity-dissimilarity (Everitt, 1993; Overall et al, 1993; Romesburg, 1984).

In the second step, the initial solution was subject to a *k*-means relocation technique, known as quick cluster, again using squared Euclidean distance as the similarity-dissimilarity measure. Use of clustering techniques that make only a single run through the data has been criticised for not allowing relocation of cases that may have been poorly classified in the initial groupings (Kaufman & Rousseeuw, 1990). Relocation procedures maximise between-group variance and minimise pooled within-group variance, thereby 'sharpening' the solution (Everitt, 1980;

[6] Cluster analysis is a statistical technique that can use the differences and similarities between respondents to identify groups of respondents with similar response characteristics. There are a number of techniques that may be used in a cluster analysis. The decisions made for the analysis reported here are discussed in this section of the report.

Morris, Blashfield, & Satz, 1981). The cluster centroids of the final solution describe the profile for each cluster (Aldenderfer & Blashfield, 1987; Hair, Anderson, & Tatham, 1984).

Number of clusters

As there is no universally accepted method for determining the appropriate number of clusters in a given analysis, the recommended practice is to apply several methods (Blashfield & Aldenderfer, 1978; Everitt, 1993; Romesburg, 1984). As a starting point, the dendrogram was examined. A dendrogram or cluster tree plot is a graphical representation of the hierarchical groupings of cases to clusters (Chambers & Kleiner, 1982). The grouping of each case to successive clusters is presented in a systematic, branch-like manner. The dendrogram suggested three or four main groups were inherent in the data.

In order to check the validity of the three and four-cluster solutions and to clarify that each factor contributed significantly, multivariate analyses of variance were performed. While Hartigan (1975) cautions that clusters are computed to be separate groups and therefore significant differences across groups are expected, Romesburg (1984) argues that this is a necessary procedure to clarify where the differences are and to assist interpretation. The general liner model was significant both for the three-cluster solution ($F_{(38,\ 1638)} = 69.20$, $p = .000$) and four-cluster solution ($F_{(57,\ 2457)} = 52.23$, $p = .000$). Each factor contributed significantly to the three-cluster solution and revealed meaningful differences between the clusters. While the four-cluster solution also yielded significant differences, the solution did not substantially add to the interpretability of the data. Several researchers have argued that interpretation, usefulness, and simplicity of the cluster solution are most important and that the appropriate number of clusters should be decided based on this principle (Blashfield & Aldenderfer, 1978; Everitt, 1980; Gnanadesikan & Wilk, 1969; Spath, 1980; Williams & Dale, 1965). Therefore, the three-cluster solution was chosen as the best representation of the data for the present analysis.

To further validate the choice of the three-cluster solution, a discriminant function analysis was conducted (Bradfield & Orloci, 1975; Dillon & Goldstein, 1984; Filsinger, Faulkner, & Warland, 1979; Green & Vascotto, 1978; Klapow et al, 1993; Liaw & Brookes-Gunn, 1993). The analysis produces a summary of the percentage of cases correctly classified into the clusters by the discriminating variables, which gives an indication of the accuracy of the cluster solution (Filsinger et al, 1979; Klecka, 1980). The analysis confirmed the presence of three discriminant functions (with a combined $\chi^2_{(38)} = 1661.25$, $p < .05$), for which 95.7% of cases were correctly classified.

Cluster descriptions

Given that the overall model for the three-factor solution was significant (as reported above), oneway analyses of variance were performed using Scheffé comparisons for each factor in order to identify the sources of differences between the clusters. Scheffé comparisons protect against inflated Type I error and are considered one of the most conservative comparisons (Tabachnick & Fidell, 1989). Results for the analyses are displayed in Table 2. Cluster profiles are represented by column scores and are contrasted by comparison of row scores.

Table 2: Means and ANOVA results of factor scores by cluster membership[7]

	Average (*N* = 858)	**Cluster 1 (*n* = 397)**	**Cluster 2 (*n* = 329)**	**Cluster 3 (*n* = 132)**	***F* statistic**
Factor I Personal seat belt attitudes and behaviour	9.33	9.63[a]	9.65[a]	7.63[b]	$F_{(2, 855)} = 570.50$, $p < .05$
Factor II Perceptions of driving ability	7.29	8.54[a]	6.13[c]	6.44[b]	$F_{(2, 854)} = 455.89$, $p < .05$
Factor III Other driving attitudes and behaviours	8.34	9.06[a]	8.03[b]	6.92[c]	$F_{(2, 855)} = 275.80$, $p < .05$

The three clusters can be described as follows:

- *Cluster 1: Committed seat belt users with strong positive driving attitudes and behaviours, and high perceptions of their driving ability.* The first cluster profile scored above average on all three factors and highest on the factors representing perceptions of driving ability and other driving attitudes and behaviours. This profile reflects a strong commitment to seat belt use and road safety, both in attitudes and behaviours, and a strong positive perception of personal driving ability in relation to others. This was the largest group with 397 drivers (159 male, 236 female, 2 unknown).

- *Cluster 2: Committed seat belt users with good driving attitudes and behaviours, but lower-than-average perceptions of their driving ability.* This group of respondents scored equally high with those of Cluster 1 on the factor representing positive seat belt attitudes and behaviours. They also scored reasonably high, although below average, for other driving attitudes and behaviours. However, this group scored the lowest on perceptions of their driving ability. Overall, this profile represents a strong commitment to seat belt use, general support for other road safety issues, together with a mild regard only for their driving ability. This was also a large group comprising 329 drivers (140 male, 189 female).

- *Cluster 3: Less-committed seat belt wearing and driving attitudes and behaviours with lower-than-average perceptions of their driving ability.* The final cluster scored below average on all three factors, therefore showing the lowest regard for seat belt use and other road safety issues of the present sample of drivers. Respondents in this group also perceived their driving ability at a below average level, although somewhat higher than

[7] In each row, the superscript letter applied to each mean is an indication of significant differences between the means using *post-hoc* tests. Means with different superscript letters differ significantly from each other.

drivers in Cluster 2. Therefore, this group reflected the least committed approach to seat belt use and other road safety issues, and a mild regard for their driving ability. There were 132 drivers (82 male, 49 female, 1 unknown) in this group.

For simplicity and ease of comparison, these three groups were described as those with *good*, *intermediate*, and *poorer road-safety profiles*, respectively. It should be noted that the general descriptions of the clusters are based on the mean factor scores. It would be expected that there would be a range of seat-belt related behaviours and attitudes, for example, in each cluster.

Profiles of the three groups of drivers

Final analyses explored differences between the three groups of drivers on the demographic details included in the survey. A series of oneway analyses of variances was conducted using Scheffé comparisons. The results are shown in Table 3.

As shown in Table 3, significant differences were found among the groups for age and percentage of average weekly driving hours driving in daylight. Post-hoc tests suggested that drivers with a good road-safety profile were on average somewhat older than the other two groups, and drivers with good and intermediate road-safety profiles spent a greater percentage of time driving in daylight hours than drivers with poorer profiles. There were no significant differences for other variables in Table 3, however further differences were found for both sex and licence type.

Table 3: Means and ANOVA results of demographic variables by cluster membership

	Average (*N* = 858)	**Cluster 1 (*n* = 397)**	**Cluster 2 (*n* = 329)**	**Cluster 3 (*n* = 132)**	***F* statistic**
Age	44.70	47.68	42.48	41.29	$F_{(2, 850)} = 14.33$, $p < .05$
Age first got licence	20.67	21.03	20.54	19.92	$F_{(2, 855)} = 2.17$, $p > .05$
Driving hours per week	12.58	13.02	11.66	13.54	$F_{(2, 855)} = 1.86$, $p > .05$
Driving in daylight (%)	80.20	82.04	80.35	74.30	$F_{(2, 855)} = 7.52$, $p < .05$
Driving in 60 km zones (%)	65.15	66.69	64.66	61.71	$F_{(2, 854)} = 2.05$, $p > .05$
Driving for work (%)	11.45	11.80	9.74	14.70	$F_{(2, 848)} = 2.00$, $p > .05$

Examination of the composition of the groups by sex (as reported in the cluster descriptions) showed the driving groups with good and intermediate road-safety profiles were comprised of more females than males, while the reverse was true for the group with a poorer road-safety profile ($\chi^2_{(2)} = 20.75$, $p<.05$). To identify which differences contributed to the significant finding, standardised adjusted residuals were examined. Adjusted residuals are an index of the discrepancy between observed frequencies and expected frequencies. Standardised adjusted

residuals can be interpreted in a similar manner to standard scores such that residuals greater that ±2 show a strong effect (Cohen, 1968).

Examination of the standardised adjusted residuals (*Res*) confirmed that drivers with a good road-safety profile were statistically more likely to be female (*Res* = 2.3) and that drivers with a poorer road-safety profile were far more likely to be male (*Res* = 4.5).

Chi-squared analyses also revealed significant differences between the clusters according to the type of licence they held ($\chi^2_{(4)} = 17.29$, $p < .05$). Licence types were divided into probationary, full, and other types. Only one other type of licence was reported by a respondent in the first cluster. The breakdown of probationary and full licences by both number and percentage is presented in Table 4.

Table 4: Type of licence held by drivers in the three groups

Licence Type	Total (*N* = 858)	Cluster 1 (*n* = 397)	Cluster 2 (*n* = 329)	Cluster 3 (*n* = 132)
Full	810 (94.4%)	386 (97.5%)	307 (93.3%)	117 (89.3%)
Probationary	45 (5.2%)	9 (2.3%)	22 (6.7%)	14 (10.7%)

From Table 4 it can be seen that the majority of drivers' held a full licence. The pattern of results for clusters indicates that while the majority of drivers' in each group held a full licence, compared to the total percentages, the first group's percentages were balanced somewhat more towards full licences and the third group's percentages balanced more towards probationary licences. Examination of the standardised adjusted residuals for this analysis confirmed that drivers with a good road-safety profile were statistically more likely to have a full licence (*Res* = 3.4), whereas drivers with a poorer road-safety profile were more likely to hold a probationary licence (*Res* = 3.0).

Given these differences in licence type, it was decided to examine age differences in closer detail. Age was broken down into three age groups as shown in Table 5 below.

Table 5: Age by groups for the three groups of drivers

Age	Total (*N* = 853)	Cluster 1 (*n* = 394)	Cluster 2 (*n* = 327)	Cluster 3 (*n* = 132)
17-25 years	91 (10.7%)	24 (6.1%)	42 (12.8%)	25 (18.9%)
26-50 years	470 (55.1%)	214 (54.3%)	181 (55.4%)	75 (56.8%)
51-90 years	292 (34.2%)	156 (39.6%)	104 (31.8%)	32 (24.2%)

Chi-squared analyses indicated significant differences between the clusters according to age group ($\chi^2_{(4)} = 25.49$, $p < .05$). Of the three age groups, standardised adjusted residuals revealed that drivers with a good road-safety profile were more likely to represent the oldest age group (*Res* = 3.1) and far less likely to represent the youngest age group (*Res* = -4.0). In contrast, drivers with a poorer road-safety profile were more likely to represent the youngest age group (*Res* = 3.3) and less likely to represent the oldest age group (*Res* = -2.6).

D. DISCUSSION

The results suggested that responses to the telephone survey were based on three underlying patterns or perceptions – perceptions of personal seat belt use and attitudes, perceptions of personal driving ability, and perceptions of other driving-related behaviours and attitudes.

Analyses based on these underlying response patterns suggested there were three groups of drivers. The first group reported a commitment to regular seat belt use and very positive road-safety-related attitudes and behaviours, together with a high regard for their driving ability. A second group was also committed to regular seat belt use, with quite positive road-safety-related attitudes and behaviours, however with only a mild regard for their driving ability. The final smaller group of drivers reported the least favourable seat belt and road-safety-related attitudes and behaviours and a somewhat mild regard for their driving ability. For simplicity and ease of comparison, these three groups were described as those with good, intermediate, and poorer road-safety profiles, respectively.

Comparison of demographics details particularly contrasted two of the groups of drivers. The first group were drivers with a good road-safety profile who were somewhat older on average and included more drivers in the 51-90 year-old age range. They spent more time driving in daylight hours compared to the other groups, and were more likely to be female and to hold a full licence. These drivers contrasted with a group of drivers with a poorer road-safety profile, who were somewhat younger on average and included a greater proportion of 17-25 year-olds within the group compared to other groups. They spent less time driving in daylight hours compared to the drivers with a good road-safety profile, and were more likely to be male and hold a probationary licence compared to other groups. A final group of drivers, those with an intermediate road-safety profile, was of a similar age on average to the drivers with a poorer profile, and spent a similar percentage of their time driving during daylight hours as the drivers with a good profile. These drivers were not distinguished statistically by one particular sex or licence type.

Overall therefore, analyses revealed three underlying response patterns and profiled three different types of drivers. As expected, better and poorer road-safety attitudes and behaviours were identified, and the attitude towards seat belts was found to vary among the groups. In particular, two groups of drivers, those with good and intermediate road-safety profiles showed a strong commitment to seat belt use and positive seat belt related attitudes. While the additional group of drivers, those with a poorer road-safety profile, showed a less positive score on the seat belt related factor compared to the other two groups, the score was still well above the moderate response range (from a possible range of 0-10, the average score on this factor was 7.63). Therefore, it is likely that this group of drivers quite often used their seat belts. In the general literature review the complexity of determining seat belt use was discussed. In particular, the inconsistent user (one who does not always wear a seat belt in certain situations, for example, on short trips) was distinguished from the non-user (one who never uses a seat belt). It is highly likely that the third group of participants identified in the present study was largely comprised of inconsistent users rather than non-users.

It is important to note that the cluster analysis technique is unlikely to have distinguished between seat belt users and non-users in anything other than an approximate fashion. The factor analysis on which the cluster analysis was based accounted for only 41% of the variance in the 19 items, and these items represented only a small fraction of the possible items that could be used to assess seat belt related behaviours and attitudes. At best, the cluster analysis provides a guide to approximate groupings of participants that reflect potential seat belt related behaviours and attitudes as they are assessed here. Given the arguments raised earlier that non-use may reflect either consistent non-use or inconsistent seat belt use, and that items in the survey did not clearly reflect this dichotomy, it is likely that some of the people in the good and intermediate clusters are also non-users or inconsistent users. The accuracy of the cluster analysis is assessed in Chapter 7.

CHAPTER 7: DISCUSSION GROUPS

A. OVERVIEW

The pilot of the survey and discussion groups provided some data that allowed the recruitment method and discussion format to be improved. It was considered important, however, to trial the method more fully to meet the following aims:

- To ensure that the recruitment method using the criterion defined in the previous section performed well;
- To ensure that the group-discussion approach provided a reasonable simulation of social processes; and
- To collect data relevant to seat belt related motivations and the acceptability of the seat belt reminder system.

The results reported in this Chapter address these aims. Discussion of the results is presented in the following two Chapters.

B. METHOD

Participants

Participants were recruited during the telephone survey described in Chapter 6. Participants who met the recruitment criterion (see page 30) were asked if they would be interested in taking part in a small discussion group at the University concerning seat belts and a new seat belt technology. Those who agreed were asked to provide contact details, and were then contacted to arrange a discussion group time. Potential discussion group members (from the survey pool) were contacted in no particular order until the planned twelve discussion groups were filled.

Discussion Groups

Twelve discussion groups were conducted over a four-week period. Most of the groups were conducted on weeknights, and some on Saturday afternoons, to ensure participation was not hindered by limited availability of session times. About eight participants were enrolled for each group, but an average of two participants failed to turn up at each group, leaving an average of six participants per group.

The groups were conducted as recommended in Chapters 4 and 5, with the main aim being to simulate (for part of the session) the social processes that might occur with the introduction of a new in-vehicle technology. Each discussion group session involved the following:

- An introduction to the project and the facilitators, and a brief introduction to the Centre.

- A formal explanation of the project and the completion of informed consent forms by participants to satisfy ethical considerations.

- Completion of the pre-discussion questionnaire (see Appendix B) which collected detailed seat belt use data, motivational information, demographic data, and initial reactions to the idea of a seat belt warning technology.

- A detailed explanation of the seat belt reminder system technology commencing with the presentation of some background (including the some of the history of seatbelts and attempts to introduce seat belt interlocks in north America), and utilising the Team Forslund (1999) video detailing the seat belt reminder system technology. This video provides a detailed understanding of the interface between the technology and the user.

- Opportunity to ask questions about the technology.

- The guided discussion, which focused on the following:

    - First reactions to the technology;
    - Immediate thoughts about getting around the technology;
    - Predictions about how friends will react to the technology;
    - Predictions about how drivers in general will react;
    - Feelings about how it will feel having the car interfere in behaviour;
    - Predictions about how the technology will affect seat belt use;
    - Predictions about how the technology will affect seat belt use in cars without the technology (transfer effects);
    - Whether participants feel tempted to try and beat the technology; and
    - Suggestions about how could the technology be beaten and the likely success of doing this.

  The discussion attempted to balance guidance towards the issues noted above and allowing discussion to proceed without interference.

- Completion of the post-discussion survey (see Appendix C), which collected data on likely reactions to the technology, beliefs about others' reactions to the technology, and feedback about the discussion group.

C. RESULTS

Participants

There were 72 participants divided into 12 discussion groups. Fifty-one percent of participants were male. The average age of participants was 44.7 years (range of 18 years to 73 years). They reported a mean of 13.2 hours per week of driving activity (from 1 hour per week to 55 hours per week), and reported that an average of 76.5% of their driving was during the day, and that an average of 11.5% was for work-related purposes.

These participants were drawn from a larger sample of 215 survey participants who agreed to take part in the survey when asked, and 452 participants who were asked about taking part.

There was some concern that the recruitment process for the discussion groups may have resulted in a biased group of group participants. This was assessed by comparing those asked to take part with those who were not (to assess the planned bias in the former group towards non-wearers of seat belts), and those who agreed to take part when asked with those who did not (to assess the potential bias of the discussion group participants resulting from motivation to take part in this type of activity).

Of the total telephone survey sample (957), 452 respondents met the discussion-group criterion outlined earlier (about 47% of the telephone survey sample) and were asked about taking part in the discussion groups. There was no age difference between the two groups (participants who met the criterion and those who did not). The two groups differed significantly on a number of telephone-survey items, including their mean criterion scores (the potential discussion group participants had a mean criterion score of 9.1, the others had a mean score of –1.4, ($F_{(1,950)} = 402.4$, $p<.05$)). Table 6 shows the pattern of differences between the groups.

Table 6: Differences between participants invited to take part in the discussion groups and those who were not. Items are those in the telephone survey. Differences were assessed for each item using a t-test and a significance level of p<.05.

Participants asked to take part in the discussion groups scored significantly higher on these items	Participants asked to take part in the discussion groups scored significantly lower on these items
• I tend to drive faster than most other drivers • I am generally a forgetful person • Wearing a seat belt is sometimes a hassle • Sometimes I have to remind myself to put my seat belt on • One of the strongest reasons I have for wearing a seat belt is that I might be fined • I sometimes take my seat belt off before I get into my driveway • I sometimes forget to wear my seat belt when I am a passenger	• Percentage of driving exposure in daytime driving conditions • I am safer than other drivers my age • Road safety is one of the most important issues in the community • I am more cautious than other drivers • I always wear a seat belt when driving • I always wear my seat belt when reversing a car • I always wear my seat belt when driving in a car park • I always wear my seat belt on short trips • It's annoying seeing other adults driving without their seat belts on • Wearing a seat belt is automatic for me • I feel very uncomfortable without a seat belt on

These results suggest that the use of the criterion outlined earlier resulted in the selection of potential participants for the discussion groups who were appropriately biased towards non-use of seat belts.

Although 452 participants met the criterion and were asked to be involved in the discussion groups, only 215 (47%) agreed to take part. While there are a number of potential reasons for not taking part, it was important to ensure that those who agreed did not differ from the others on any of the seat belt related measures.

The sexes and mean ages of the two groups were compared, as were responses to the telephone survey items relevant to the criterion discussed above. There were no statistically significant differences between the two groups. This suggests that those who agreed to take part in the discussion groups did not differ from those who refused on seat belt related measures.

Recruitment and Earlier Results

Chapter 6 included a discussion of the results of a cluster analysis that suggested there were three clusters or groups of telephone-survey participants with similar responses to the survey items.

The scores on the recruitment criterion differed between the three clusters ($F_{(2,853)}$ = 524.2, p<.05), with post-hoc tests indicating that the mean criterion score for the third cluster (14.4) was significantly higher than the mean criterion score for the first and second clusters (-.3, & -.2 respectively). The third cluster was identified in Chapter 6 as the least likely to have positive attitudes towards seat belts.

Members of all three clusters were asked to take part in the discussion groups, and members of all three clusters agreed to take part. The relationship between the recruitment criterion scores and cluster membership is shown in Figure 7.

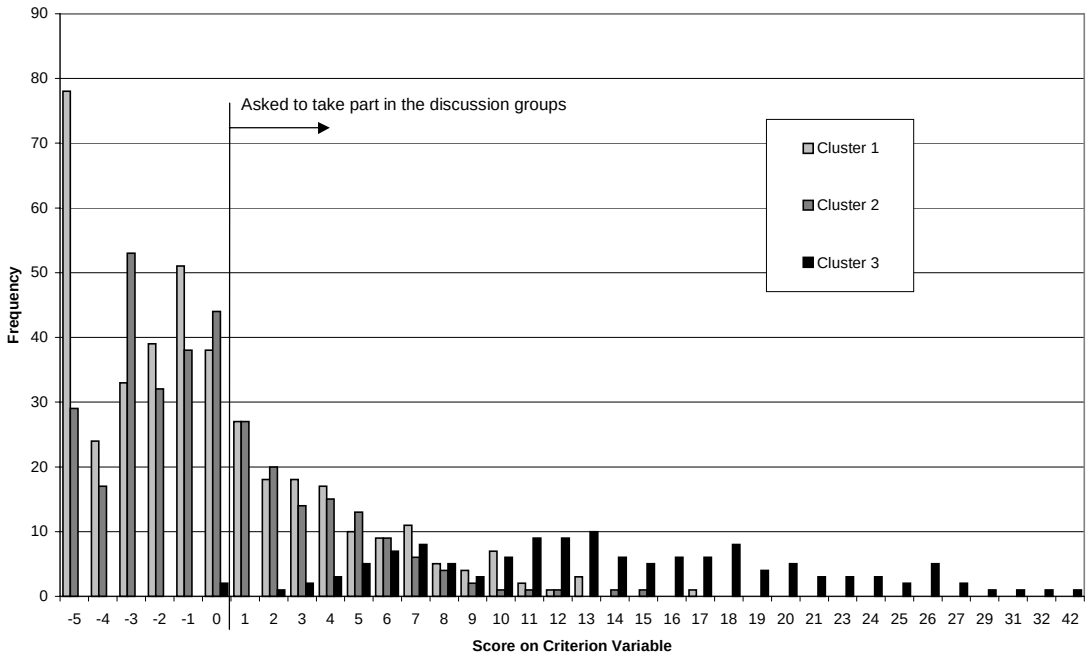

Figure 7: Distribution of criterion variable scores disaggregated by cluster membership

The results in Figure 7 show that members of cluster 3 (the "poor" cluster described in Chapter 6) almost all met the criterion defined in the pilot study. Some members of the other clusters also met the criterion, suggesting that their seat belt related attitudes and behaviours were similar (in some ways) to those of members of cluster 3.

Members of the third cluster were significantly more likely to be asked to take part (as a result of meeting the criterion)(χ^2 = 117.3, p<.05), with 87% invited to take part compared to 35% of cluster 1 members and 38% of cluster 2 members. Similarly, members of the third cluster were more likely to take part in a discussion group (12% of them took part) than were members of the first or second clusters (7% and 6% respectively)(χ^2 = 6.4, p<.05).

The results suggested that the refusal rate (when asked to take part in a discussion group) was similar for the three clusters (χ^2 = 0.2, p>.05). The lowest refusal rate occurred in the second cluster (50%), compared to the highest in the third cluster (53%).

Pre-Survey

Participants in the discussion groups completed a survey prior to hearing about the technology and taking part in the discussion. The first items in the survey related to seat belt usage, seeking detailed information about usage in different driving actions and different driving contexts. Respondents indicated the percentage of time they used a seat belt when driving in each. Mean responses are shown in Table 7.

Analysis of the data (using repeated-measures analysis of variance) suggested that there were no statistically significant differences in seat belt wearing rates across the different driving contexts ($F_{(8,56)}$ = 1.6, p>.05), but that seat belt wearing rates did differ across the driving actions ($F_{(13,51)}$ = 11.8, p<.05). The means in Table 7 suggest that seat belt use is less common amongst this group in situations that involve less speed and (arguably) less risk of collision. Post-hoc comparisons between the means suggested, compared to seat belt wearing in peak-hour traffic, that wearing rates were significantly lower for actions up to and including driving on short trips on residential streets (see Table 7).

The pre-survey also collected data concerning the motivations that encourage and discourage seat belt use amongst this group of non-wearers. These data were relevant both to seat belt reminder systems and to the broader issues relating to encouraging seat belt use with public education and enforcement programs.

The mean ratings for these items are shown in Figure 8 and Figure 9. The data presented in Figure 8 suggest that the main motivators for seat belt use amongst this group of people related to safety and habit. Other factors were less important. The data in Figure 9 relate to motivations that discourage seat belt use. Amongst these participants, there were several discouragements for seat belt use, including short trips, forgetfulness, beliefs about the potential dangers of seat belt use, low perceived levels of punishment, and beliefs about the low probability of having a serious crash.

Table 7: Mean ratings of seat belt use for each combination of driving action and driving situation

Situations →	When you are the **driver**								When you are a passenger	**MEANS**
	Different times of the day			Different weather		Who is in the car				
Driving Actions	Day	Evening	Late Night	Dry	Wet	Just yourself	A same-sex friend	Family members		
Starting the car	38	39	42	38	40	37	36	40	66	42
Reversing from a parking space in a car park	59	58	61	59	61	58	60	63	74	62
Moving the car to another parking spot	56	57	57	56	58	55	54	57	62	57
Reversing from a parking space onto a road	74	75	78	73	75	74	74	75	83	76
Reversing from a drive-way	64	65	67	64	67	64	64	66	78	67
Approaching your own drive way	92	91	91	92	93	91	90	92	90	91
Leaving the kerb and moving into the traffic lane	92	93	93	92	96	92	94	93	93	93
Driving on a short trip in quiet residential streets	90	91	91	90	93	91	93	92	90	91
Driving on a busier street with a 60 km/h limit	96	96	96	96	97	96	95	96	95	96
Driving on an arterial road with an 80 km/h limit	99	99	99	99	99	99	98	98	97	99
Driving on a freeway	99	98	99	98	99	98	98	98	97	98
Driving on a rural highway	98	98	99	98	99	98	97	98	97	98
Driving on a quiet rural back road	99	99	99	99	99	99	99	99	97	98
In peak hour bumper-to-bumper traffic	99	99	99	99	99	97	97	98	97	98
Driving on familiar roads[8]										
MEANS	82	83	82	82	82	82	82	83	87	83

[8] Analysis of this item was not conducted. About halfway through the group discussion it was decided to change the item to relate to unfamiliar roads.

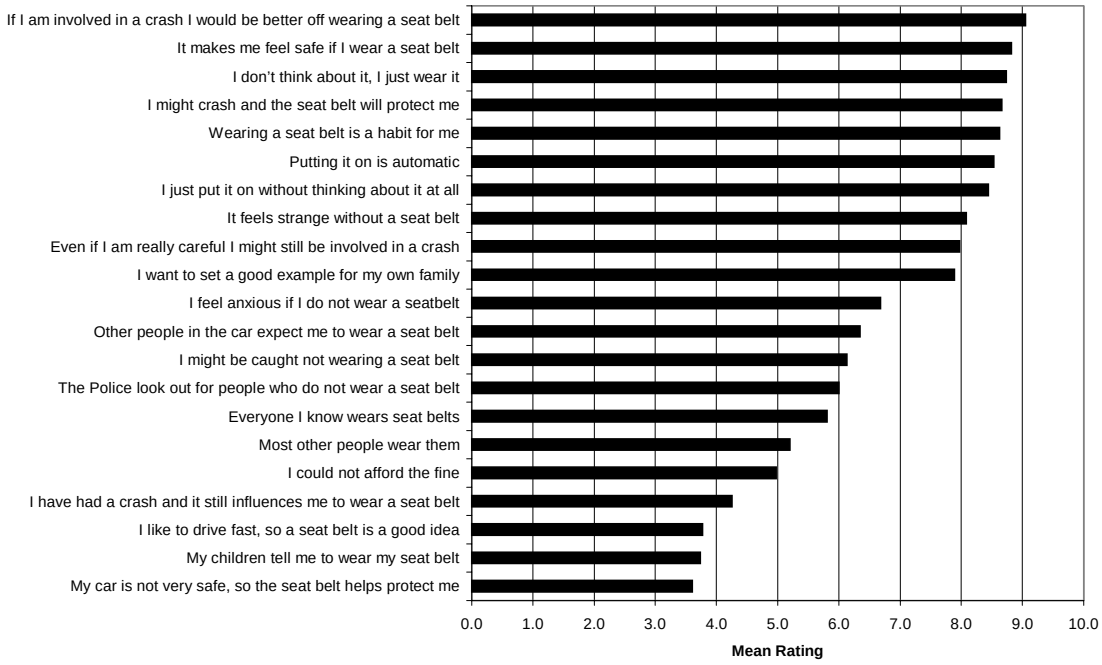

Figure 8: Mean ratings for motivations that encourage seat belt use, presented in descending order.

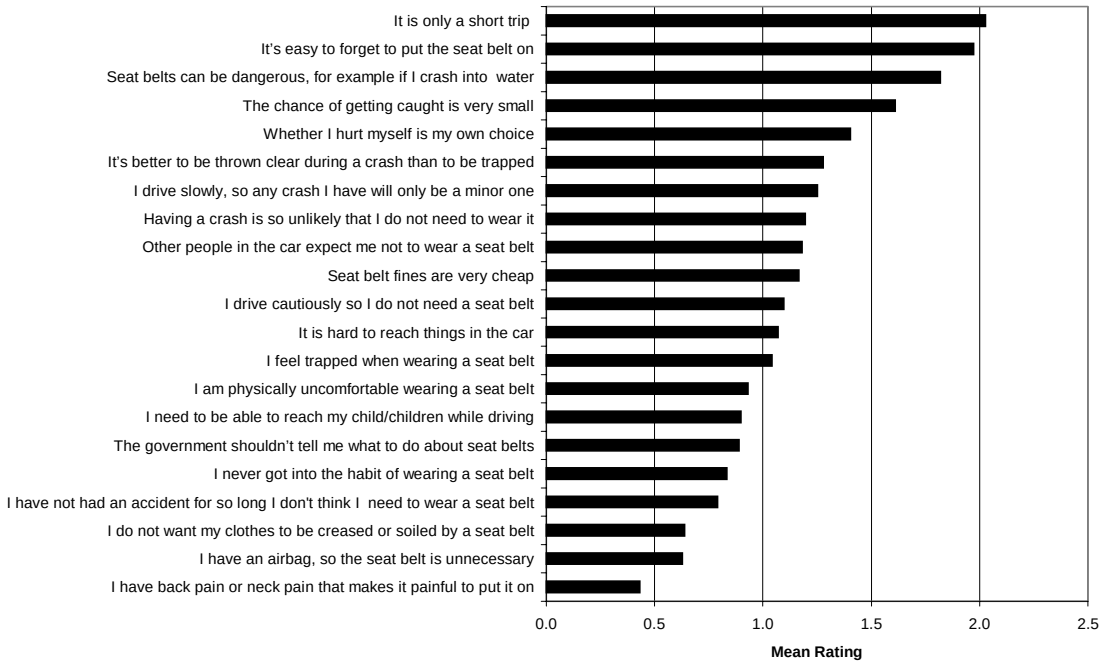

Figure 9: Mean ratings for motivations that discourage seat belt use, presented in descending order.

The mean wearing rate was calculated for each participant and compared to relevant items in the telephone survey. Each participant was assigned an identification number in the telephone survey that followed them through the project, allowing comparisons between surveys. The correlation between the average wearing rate and the telephone survey items is shown in Table 8. These data allow an investigation of the consistency between the two surveys.

Table 8: Correlations between telephone survey items and average seat belt wearing rate from the pre-survey. Only statistically significant correlations (p<.05) are shown.

Items in telephone (recruitment) survey	Correlation with average wearing rate in pre-survey
I always wear a seat belt when driving	.52
I always wear my seat belt when reversing a car	.37
I always wear my seat belt when driving in a car park	.30
I always wear my seat belt on short trips	.61
It's annoying seeing other adults driving without their seat belts on	.28
Wearing a seat belt is automatic for me	.74
I feel very uncomfortable without a seat belt on	.27
I tend to drive faster than most other drivers	-.25
Wearing a seat belt is sometimes a hassle	-.31
Sometimes I have to remind myself to put my seat belt on	-.48
I sometimes take my seat belt off before I get into my driveway	-.42
I sometimes forget to wear my seat belt when I am a passenger	-.42
I am safer than other drivers my age	.
Road safety is one of the most important issues in the community	.
I am more cautious than other drivers	.
I am generally a forgetful person	.
One of the strongest reasons I have for wearing a seat belt is I might be fined	.
It's annoying seeing children without their seat belts on	.

The data in the above table show that the responses to the seat-belt wearing item in the pre-survey and the relevant items in the telephone survey were consistent. The statistically significant correlations were in the expected direction. People with higher levels of self-reported seat belt use in the pre-survey were more likely to agree strongly with items relating to seat belt use and the habitual nature of seat belt use, and were less likely to agree strongly with items relating to items that suggest lower levels of seat belt use.

The inclusion of motivational items in the pre-survey allowed an investigation of the extent to which different motivational factors are associated with higher levels of seat belt use. Table 9 shows the statistically significant correlations between the responses to the motivational items and the average seat belt wearing rate. It also shows the correlations between the motivational items and the average seat belt wearing rate when pulling out from the kerb. It was considered that this represented an important decision point in habitual seat belt use (see below for a discussion).

These correlations suggest that habitual reasons for wearing a seatbelt are the best predictors of seat belt use. This was particularly so in the case of wearing rates when leaving the kerb – the only motivations that encourage use that correlated with these rates were those relating to habitual or automatic use. Seat belt use was negatively correlated with a number of the discouraging motivational factors, in particular factors associated with the failure to develop habitual seat belt behaviours, trip length, and the low risk of detection.

Table 9: Correlations between motivational items and wearing rates (only statistically significant correlations are shown)

Significant correlations between motivational item and...	Average wearing rate (all responses)	Average wearing rate for pulling out from the kerb
If I am involved in a crash I would be better off wearing a seat belt		.
It makes me feel safe if I wear a seat belt	.40	.
I don't think about it, I just wear it	.45	.36
I might crash and the seat belt will protect me	.25	.
Wearing a seat belt is a habit for me	.51	.47
Putting it on is automatic	.57	.50
I just put it on without thinking about it at all	.50	.37
It feels strange without a seat belt	.43	.33
Even if I am really careful I might still be involved in a crash	.29	.
I want to set a good example for my own family	.24	.
I feel anxious if I do not wear a seatbelt	.33	.29
Other people in the car expect me to wear a seat belt	.	.
I might be caught not wearing a seat belt	.	.
The Police look out for people who do not wear a seat belt	.	.
Everyone I know wears seat belts	.	.
Most other people wear them	.	.
I could not afford the fine	.	.
I have had a crash and it still influences me to wear a seat belt	.	.
I like to drive fast, so a seat belt is a good idea	.	.
My children tell me to wear my seat belt	.	.
My car is not very safe, so the seat belt helps protect me	.	.
It is only a short trip	-.27	-.30
It's easy to forget to put the seat belt on	-.40	-.32
Seat belts can be dangerous, for example if I crash into water	.	.
The chance of getting caught is very small	-.34	-.29
Whether I hurt myself is my own choice	-.30	-.34
It's better to be thrown clear during a crash than to be trapped	.	.
I drive slowly, so any crash I have will only be a minor one	.	.
Having a crash is so unlikely that I do not need to wear it	.	.
Other people in the car expect me not to wear a seat belt	-.27	.
Seat belt fines are very cheap	.	.
I drive cautiously so I do not need a seat belt	.	.
It is hard to reach things in the car	.	.
I feel trapped when wearing a seat belt	-.30	-.39
I am physically uncomfortable wearing a seat belt	.	-.32
I need to be able to reach my child/children while driving	.	.
The government shouldn't tell me what to do about seat belts	.	.
I never got into the habit of wearing a seat belt	-.39	-.46
I have not had an accident for so long I don't think I need to wear a seat belt	.	-.24
I do not want my clothes to be creased or soiled by a seat belt	.	.
I have an airbag, so the seat belt is unnecessary	.	.
I have back pain or neck pain that makes it painful to put it on	.	.

Figure 10 shows the initial reactions to the idea of a seat belt reminder system during the pre-survey where they were asked to imagine such a system (using a brief, written description of the functional aspects of the system) and to rate their agreement with the items shown in Figure

10. The initial reaction of participants was very positive. Potentially-negative responses (such as wanting to tamper with the system) received low agreement ratings, while positive responses (such as those relating to the effect of the system) were rated more positively.

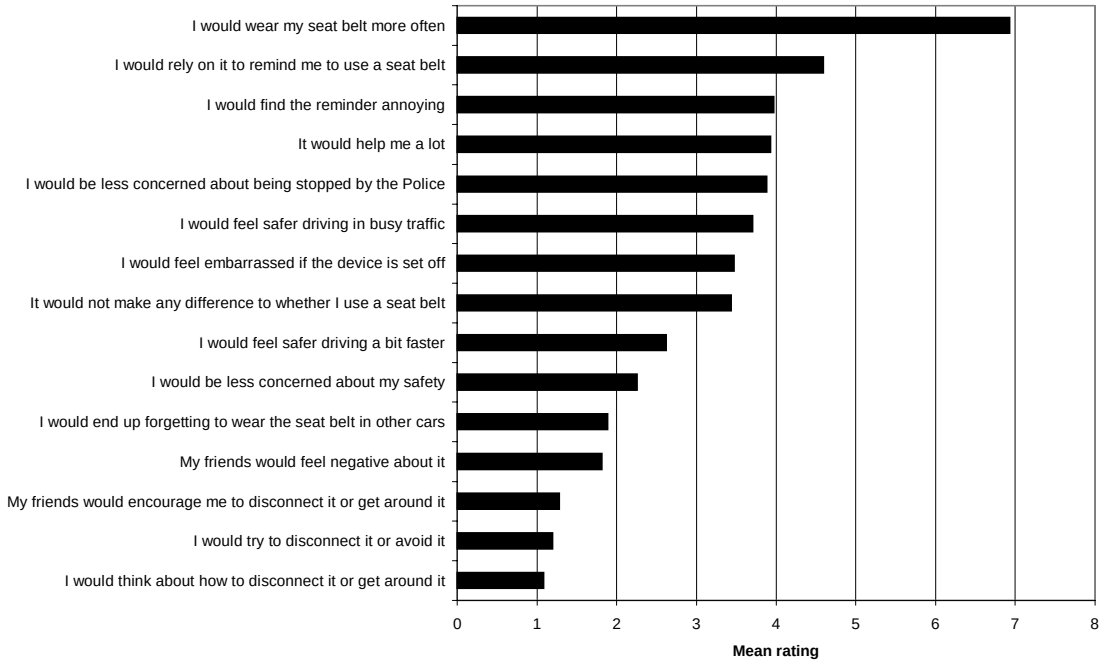

Figure 10: Initial reaction to the idea of a seat belt reminder system. Ratings completed during the pre-survey.

Discussions

The discussion sessions were videotaped, and the first author viewed each videotape and extracted general themes and discussion issues from each session. These are presented in Appendix D.

The group discussions proceeded without any problems. Some groups were more engaged in the process than others, and the presence of a technically competent person in some groups had a positive effect on the level of discussion. Groups were keen to be involved and participants seemed genuinely interested in the technology.

A number of themes recurred throughout the group discussions, including the following:

- A generally-positive reaction to the system as a reminder: Participants were all positive about the technology as it was presented, most likely because most blamed their non-use on forgetfulness. Some also thought it would be useful to encourage seat belt use by others in the car, especially children in the back seat.

- Price: Participants in most groups raised concerns about the potential impact of these devices on the price of cars, and more importantly on the price of repairs if the technology malfunctioned (see below).

- Reliability: This was perceived to be an important issue in every group. Participants expressed a need for 100% reliability given that many had heard about technology-related problems in new vehicles, especially in the engine-management systems. Some participants suggested a lifetime warranty for the device as a way to minimise concerns, although the potential problems associated with obtaining repairs were noted by some. These were thought to be a particular problem in less-populated areas of Australia.

- Volume of warning tone: Most participants agreed that the tone (as presented in the videotape) was loud enough. Some participants were concerned that the tone might not be heard over some sound systems, and that deaf people (or people with various hearing impairments) might not hear a tone.

- Child seats and restraints: Most groups raised potential problems with child restraints, particularly those that relied on a permanently fastened seat belt as part of the restraint mechanism. The suggestion that the devices might not respond to weights below some critical level that matched the weight of a child restraint raised concerns that it might therefore not respond to light children in normal seat belts.

- Avoiding the technology: Participants suggested a number of ways of defeating the technology, none of which were likely to be a problem for the intelligent technology suggested for the reminder system. The only common suggestion that might present a problem (apart from people locating a skilled auto-electrician who might be able to interfere in the system) was the installation of a manual extension to the disarming button in the engine bay that would allow drivers to disarm the system from inside the vehicle. A couple of participants suggested a cable-based extension to this that could depress the button. Very few participants expressed any interest in tampering with the technology. Those that did were male and generally younger – wanting to try it out as a challenge but not particularly interested in avoiding the reminder itself. A common theme amongst participants was "why bother?" Participants seemed uncertain about why people would try to disconnect the technology given that they perceived it to be a positive innovation.

- Loads in the car: Some participants were concerned about the effect of carrying luggage or larger pets in the motor vehicle. Although they were aware of the road safety problems associated with carrying unrestrained luggage and pets, they were concerned to ensure that the technology would not interfere with these activities. This was thought to be a potential source of annoyance for some dog owners.

- Habitual seat belt use: Participants generally felt that the reminder system would help them to develop better seat belt habits. They indicated that they would probably change their behaviour to avoid the warning tones, and that they expected this behaviour to transfer to other vehicles (without the system). Only a few participants suggested that the device might be relied on by drivers and that this might result in reduced seat belt use in other vehicles.

Participants in the last five groups were asked to comment about other ITS technologies being considered now. It was considered important to seek some data on this issue, and to assess the usefulness of a discussion-group approach for assessing the acceptability of these technologies. These discussions took place after participants had completed the post-survey, to ensure they did not interfere with participants' responses to that survey. The discussion resulted in the following main themes:

- Alcohol interlocks: The attitude to alcohol interlocks was very positive. This was particularly so for interlocks with a passive technology. This positive response may (in part) relate to ongoing publicity of this potential solution for recidivist drink drivers in Australia.

- Complexity: There was concern about the increasing complexity of the driving task in relation to the intrusion of technologies. Some participants expressed concerns about the reaction of older and younger drivers to warning signals, suggesting that confusion or panic would need to be avoided.

- Reliability: The participants were concerned about the potential for reliability problems in the context of technologies that could influence driving behaviour.

- Reliance on the technology: A number of participants indicated that they would be concerned that some drivers may rely too strongly on the technology to identify hazards and to set limits on their behaviour. It was suggested that drivers might concentrate less in this situation.

Unlike the discussion relating to seat belt reminder systems, the attitude of participants appeared to become more negative during these discussions.

Post-Survey

Participants completed a survey after the discussion, which included items concerning their response to the seat belt reminder system and their beliefs about how others would respond.

The first items in the survey sought information about reactions to the seat belt reminder system using the same items as those used at the end of the pre-survey and presented in Figure 10. Figure 11 compares the data for these items from the pre- and post-surveys. Significant differences between the pre-survey and the post-survey are shown as solid bars. There were only three items for which responses changed significantly between the beginning of the discussion group session and the end. Participants were less likely to agree strongly that that they would wear their seatbelts more often as a result of the seat belt reminder system, that they would rely on it to remind them to wear their seat belts, and that they would try and disconnect the reminder device.

Participants were asked to indicate the strength of their agreement to statements about how other people might react negatively to the seat belt reminder system. These responses are shown in Figure 12.

The results in Figure 12 suggest that participants' concerns about the negative reactions of others to the reminder systems were strongest in relation to relying on the system and attempting to circumvent it or disconnect it. They were less concerned that people might be annoyed with manufacturers or others for introducing the device and that the devices would influence people's confidence.

The final set of items in the post survey were concerned with participants' predictions about their own behaviour. The results are shown in Figure 13.

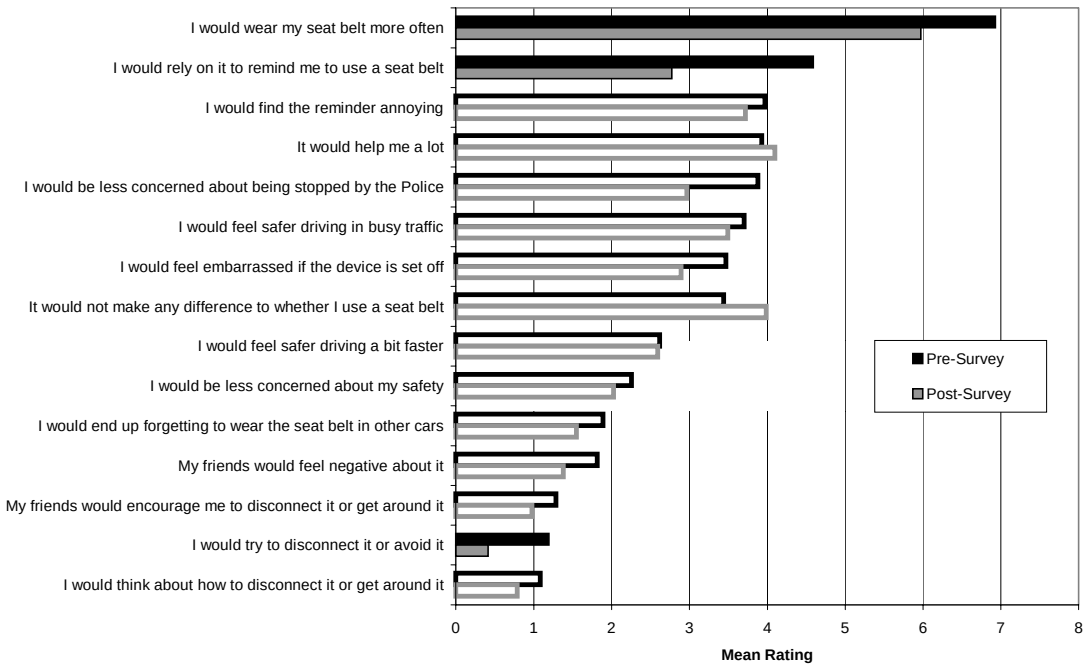

Figure 11: Reaction to the idea of a seat belt reminder system. Ratings completed during the pre- and post-surveys. Items in which there was a statistically significant difference between the pre- and post-surveys ($p<.05$) are shown as solid bars.

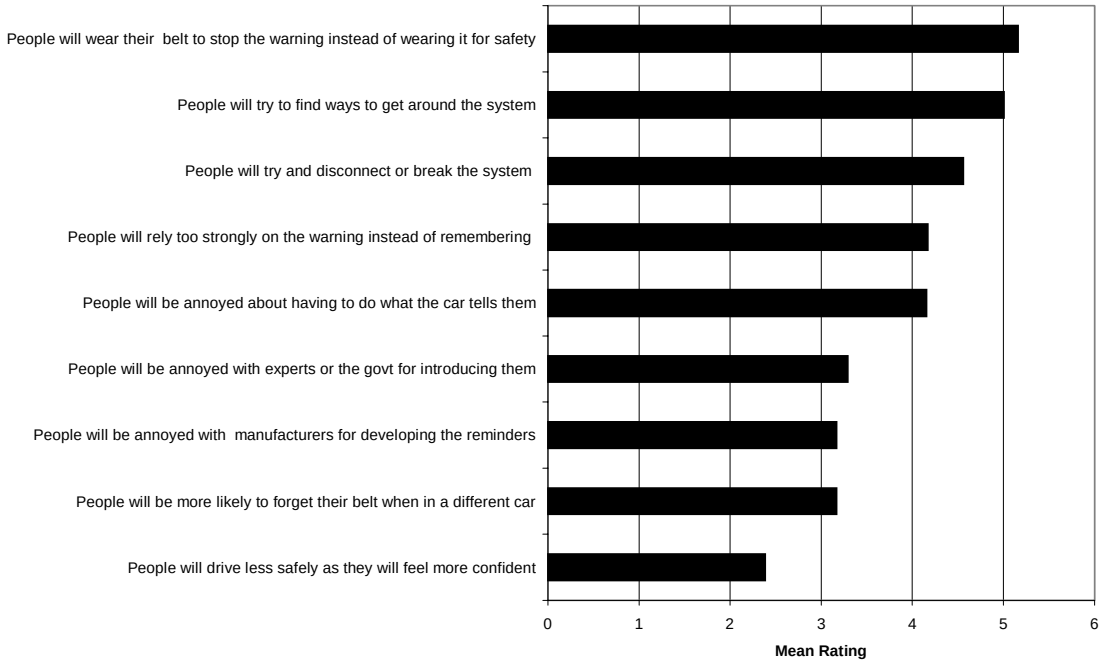

Figure 12: Perceptions of how others will respond negatively to the introduction of seat belt reminder systems. Items are presented in descending order of strength of agreement.

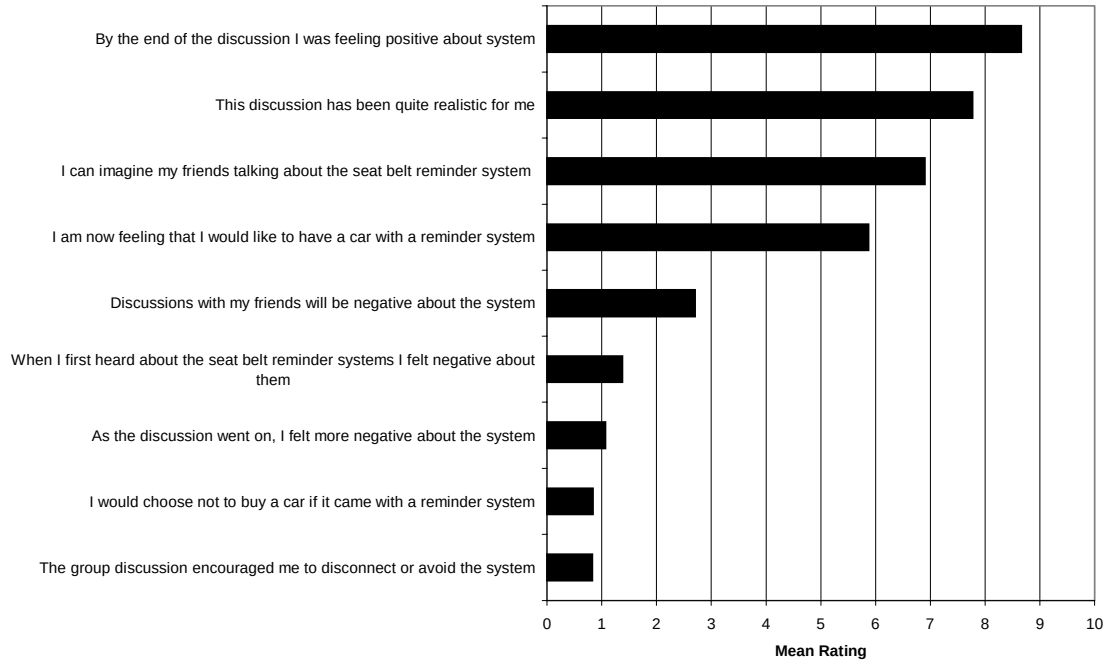

Figure 13: Participants' reactions to the discussion and predictions about their own behaviour in relation to the seat belt reminder systems. Items are shown in descending order of strength of agreement.

The results shown in Figure 13 are quite positive. People tended to agree more strongly with statements that they were positive about the reminder system, that they would buy a car with the system installed, that they could imagine their friends talking about the system, and that the discussion group had been realistic. They agreed less strongly with statements that the discussion had led them to feel negatively about the system and that they would avoid purchasing a car with the system or try to disconnect it.

Participants were also asked to provide general feedback concerning the group discussion itself. There were very few negative responses. The pre-survey was considered too complex by some participants. The presentation about the seat belt technology was viewed as clear and non-technical, and the use of the video was viewed positively. The group discussion was generally viewed as free-flowing, and participants indicated that everyone had an opportunity to have an input into it.

Surveys and Earlier Results

The results in the pre- and post-surveys were investigated given the three clusters identified in Chapter 6.

The overlap between the three clusters is apparent in Figure 14, which shows the average wearing rate distributions (from the pre-survey) for members of each cluster. It is clear that the cluster analysis did not distinguish accurately between high-level and low-level seat belt users. This is not surprising. The cluster analysis was based on factor scores derived from a relatively small number of items, and seat belt use is not a simple behaviour. If non-use is the result of inconsistent use rather than consistent non-use, it would be expected that there would be a range of seat belt wearing rates in each cluster, with a stronger bias towards non-use in the

"poor" cluster. It needs to be emphasised that the clusters were defined based on data collected in the telephone survey discussed in Chapter 6. The wearing-rate data collected in the pre-survey provides an opportunity to investigate differences between the clusters.

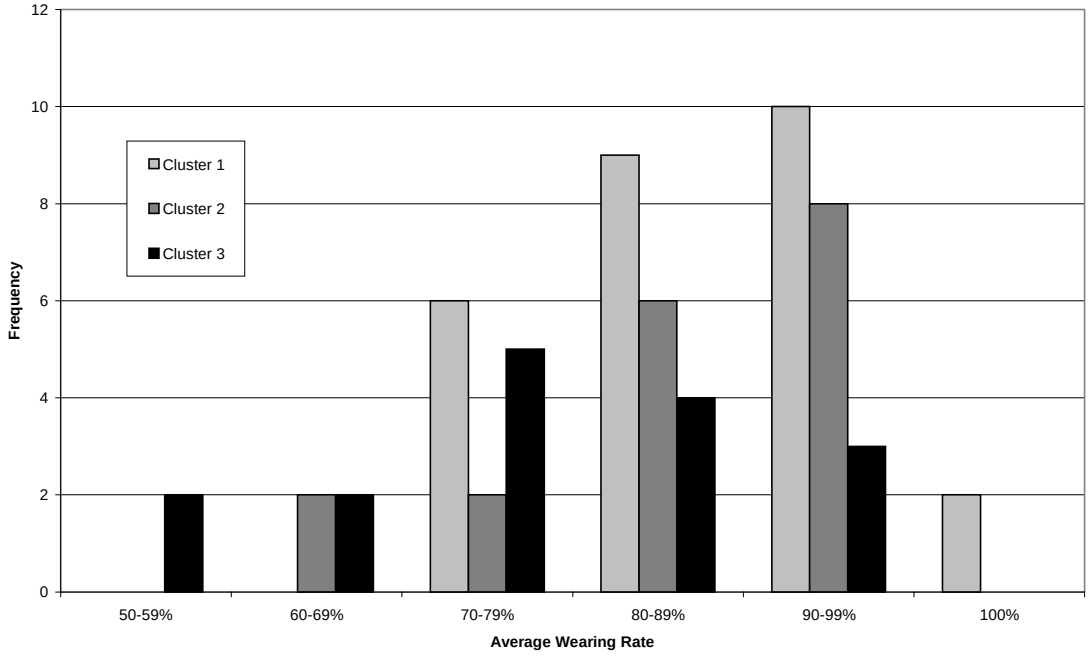

Figure 14: Average wearing rate distribution, disaggregated by cluster membership

There were a number of significant differences between the three clusters in the responses to the motivational items in the pre-survey. These are shown in Figure 15.

The data in Figure 15 suggest that the motivational factors that lead to differences in seat belt use in the three clusters relate to the automaticity of seat belt use, or its habitual nature. Members of clusters 1 and 2 had similar responses to these items, with members of the "poor" cluster indicating that seat belt use was less automated for them. It is important to point out that there were no other statistically significant differences between the three clusters on the motivational items. While this may in part relate to the small sample size, it also suggests that habit is the most important difference between users and non-users.

Participants were asked (in both the pre- and post-survey) how they would respond to the seat belt reminder system. The responses to these items in the post-survey are shown in Figure 16 where there were statistically significant differences between the clusters. Where there were differences between the clusters, they related to the level of reliance on the reminder system and the perceived consequences of this reliance on the consequences of non-use of seat belts. In each case, the members of the second cluster were less likely to rely on the system and were less likely to indicate that the reminder system would impact on their concerns about safety or detection. This suggests that members of this cluster believe their seat belt use is appropriate. Members of the third cluster indicated that they would be more likely to rely on the system, that it would help them a lot, and that they would be less concerned about some of the consequences of non-use of seat belts as a result of having the system in their car. It needs to be emphasised

that there were no significant differences between the clusters on items relating to attempting to disconnect or avoid the system.

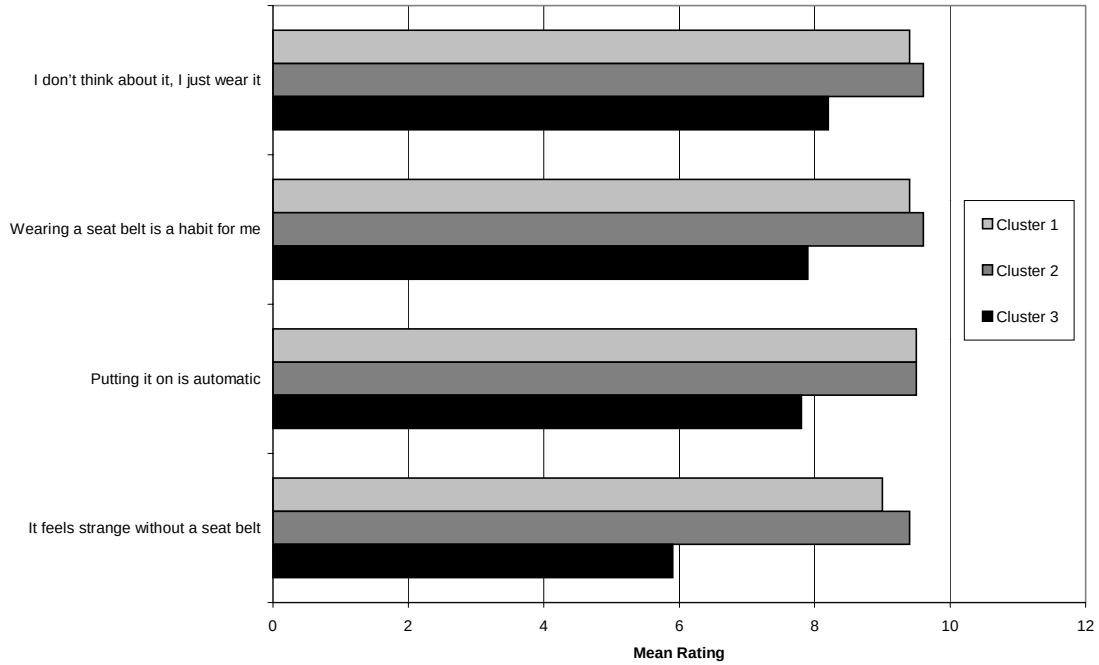

Figure 15: Cluster differences in seat belt related motivational influences

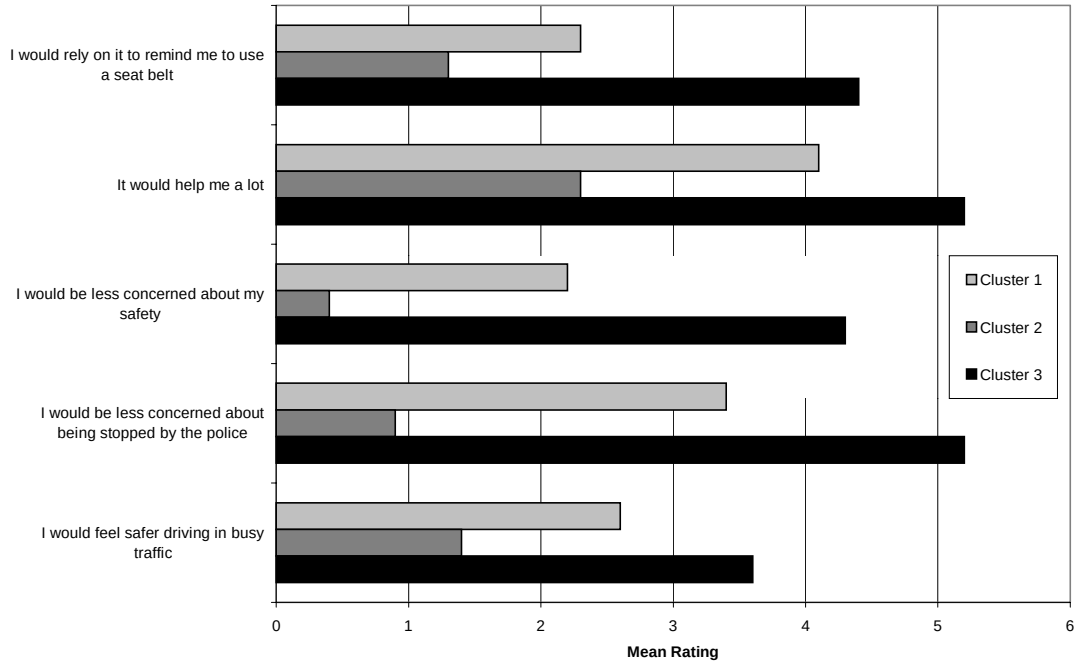

Figure 16: Reactions to the seat belt reminder system after the discussion group, disaggregated by cluster membership

CHAPTER 8: ASSESSMENT OF THE METHOD

The trial discussed in Chapters 5 through 7 was conducted to ensure the method recommended to assess the acceptability of the seat belt reminder system was appropriate for the task. This involved a trial of the full assessment method, including:

- A random-number telephone survey sampling from the broad driving population;
- Identification of potential participants for a group discussion based on responses to seat-belt related items in the telephone survey to target non-users; and
- A group discussion involving a pre-survey, information about the seat belt reminder system, guided discussion to simulate social processes concerning the introduction of the system, and a post-survey.

It was considered important that the method pass a number of tests during the trial in order to be viewed as successful in meeting its aims. These were:

- The recruitment method needed to bias the discussion group towards non-users of seat belts.
- The presentation of information about the reminder system needed to be clear.
- The discussion session needed to be a reasonable simulation of the social processes likely to follow from the introduction of the reminder systems.
- The pre- and post-surveys needed to collect data relevant to the behavioural intentions and attitudes of participants, both prior to the social simulation and after it.

A. RECRUITMENT

The recruitment component successfully targeted recruitment towards drivers with poorer-than-average seat belt wearing behaviours. Participants who met the recruitment criterion in the telephone survey were less likely to wear seat belts and were less likely to have automated seat-belt behaviours than were those who did not meet the criterion. Almost 50% of telephone survey respondents met the criterion which was developed as a result of the pilot surveys conducted using the same sampling method in 1999.

Analysis of the survey data collected for this study suggested that the respondents could have been divided into three groups or clusters. One cluster had good, habitual seat belt behaviours. One had poor seat belt behaviours (about 15% of the sample), and the third cluster was between these two extremes. Participants in the cluster with the poorest seat belt behaviours and attitudes were significantly more likely to be asked to take part in the discussion groups and were significantly more likely to take part. The refusal rate did not differ between clusters.

Taken together, these results suggest that the recruitment method successfully biased the discussion groups towards non-users of seat belts. The inclusion of members of the other two clusters in the discussion groups underscores the importance of a broad criterion. Members of cluster 3 (the "poor" cluster described in Chapter 6) almost all met the criterion defined in the pilot study. Some members of the other clusters also met the criterion, suggesting that their seat belt related attitudes and behaviours were similar (in some ways) to those of members of cluster 3.

It was also clear that there was considerable overlap between the seat belt wearing patterns of the three clusters, suggesting that the clustering undertaken in Chapter 6 might reflect general tendencies in seat belt use rather than clearly-different groups in relation to this issue.

One consequence of this issue relates to recruitment for similar research in future. It might be possible to develop a criterion for participation in the discussion groups that focuses entirely on recruitment from members of the "poor" cluster, but this method may rely too strongly on the cluster analysis results and miss the opportunity to recruit people with generally-positive road safety and seat belt attitudes but inconsistent usage patterns. On this basis, it is concluded that the recruitment method used in this study was appropriate.

B. PRESENTATION

Presentation of the technology to participants was an important component of the assessment method. It was noted earlier that an example of the technology was not available, but that this was not viewed as an unusual situation in this area where there is likely to be an ongoing need to assess the potential reaction of users to technological developments early in the development process. Assessment of the likely acceptability of ITS systems will rely strongly on the ability to present a clear description of the technology and its interaction with vehicle occupants.

The description of the seat belt reminder technology was followed by an opportunity for participants to ask any questions. This was included partly to allow participants to seek clarification of issues of fact, but more importantly to provide an assessment of their understanding of the technology. It was thought that a lack of understanding would be reflected in the type of questions asked during this time.

Questions asked by participants were concerned for the most part with the details of the technology rather than the broad function of the system or its interaction with the driver. Only a few comments or questions sought clarification of issues already covered in the explanation or the videotape. This was taken as a sign that the explanation was adequate and that participants had a reasonable understanding of its function.

The comments made by participants at the end of the post-survey also supported the clarity of the description. Where participants commented on the description of the technology or the videotape, they were positive about both.

C. DISCUSSION SESSION

The discussion session was considered critical to the success of the method. Its primary aim was to simulate the social processes that might follow from the introduction of the seat belt reminder systems. This was constrained, somewhat, by the need to incorporate clarification of some issues raised by participants throughout the discussions. This was thought, however, to be a reasonable reflection of the discussions likely to occur in social contexts as these, too, would involve some exchange of information and discussion of facts in addition to sharing of reactions and social influence.

In each group, participants were generally keen to be involved in the discussion. This would be expected, however, as participants were self-selected for involvement in the groups. The discussion in each group was wide ranging, and the mood of each group was positive.

Participants were asked to respond to the item "This discussion has been quite realistic for me". The average rating was relatively high (7.7 on a 0-10 scale), and responses to this item were not significantly related to cluster membership or average seat belt wearing rates from the pre-survey. Respondents were also asked to respond to the item "I can imagine my friends talking about the seat belt reminder system." The mean rating was, again, relatively high (6.9), but was significantly related to cluster membership ($F_{(2,58)} = 7.7$, $p<.05$). Respondents in the "good" cluster had higher ratings on this item (8.3) than the "intermediate" or "poor" clusters (5.8 and 5.4 respectively) – perhaps reflecting sex-related differences between the clusters. Responses to this item were not related, however, to average seat belt wearing rates.

It is clear that respondents felt the discussion session was realistic and that they could imagine their friends discussing the system if it becomes available.

The feedback information provided in the post-survey also suggested that the discussion section was well received. Comments were generally positive. The only negative comments related to the breadth of discussion in groups, where some participants felt the discussion was allowed to wander too freely and should have been more focused. There were only a few of these comments, however, and it is thought that the amount of guidance exercised by the facilitator was appropriate – especially in later sessions where issues were turned back to the group for discussion as much as possible.

The content of discussions across groups was remarkably consistent, as was the general reaction to the devices. Participants across the groups had similar concerns and questions about the system, and there were very few issues or themes raised in any groups that were not raised in the others. This suggests that the discussion sessions were able to tap the underlying issues that are likely to be common throughout the broader community.

D. PRE- AND POST-SURVEYS

These surveys were included to collect more information about participants and their seat belt behaviours and motivations, and to assess the effect of the information and group discussion on the likely response to the introduction of the seat belt reminder system. It was intended that the post-survey in particular would provide an individual response to the technology in the context of broader social interactions which would be expected to have some impact on behavioural intentions.

The pre-survey collected detailed information about seat belt use in a number of driving conditions, some general information about seat belts, road safety, and other issues, and information about participants' likely reactions to the new technology. The post-survey repeated the items relating to likely responses to the technology, and also collected data concerning participants' beliefs about the responses of others to the technology.

Some participants felt the first questionnaire was relatively long, particularly the first items concerning seat belt use. Given the consistency of seat belt use in higher-speed driving situations, it might be possible to reduce the number of situations in this item for Australian drivers. Whether the same could be done in other jurisdictions would depend on the results of some piloting with the survey. Apart from some concerns about this item, participants expressed no concerns about either the pre- or the post-survey.

The results of the post-survey shown in Figure 13 (relating to participants' reactions to the discussion group and predictions about their behaviour) were consistent with both the written comments in the post-survey and with the general direction of discussion during the session.

The questionnaires provided data about participants that allowed some general conclusions about seat belt use to be drawn. These are discussed in the next Chapter. They also provided data suggesting that attitudes towards the seat belt reminder system had not changed substantially during the discussion group session.

The nature of the changes between the pre- and post-questionnaires needs some discussion. It will be recalled that the purpose of the discussion groups was to allow social processes to influence the decision-making of participants in the same way as might be expected to occur with the introduction of the seat belt reminder systems in the general community. The pre-questionnaire was completed prior to any discussion of the technology, and the post-survey was completed after the group discussions.

There were surprisingly few changes in responses to the items that were included in both surveys, and one of the three significant changes in responses was in the opposite direction to that which might have been expected given the positive reaction to the technology in the discussion. The strength of participants' agreement with the statements "I would wear my seat belt more often", "I would rely on it to remind me to use a seat belt", and "I would try to disconnect it or avoid it" declined significantly between the pre- and post-questionnaires.

The differences and similarities between responses to the two questionnaires may relate to a number of factors. There were two events between the questionnaires that could have influenced the responses of participants – the information component of the session where a detailed description of the reminder system was provided, and the social simulation itself. This raises a potential problem with the assessment method. It may have been more appropriate to provide the pre-questionnaire to participants immediately after the information session and prior to the group discussion. This would have ensured that response differences between the two surveys were a direct measure of the effect of the group discussion. The problem with this suggestion, however, is that social interaction about the new reminder systems in the general community will not occur in isolation. It is likely that people will discuss the new technology in the broader context of information flow about how the new technology operates. In this sense, the placement of the first questionnaire at the start of the session (prior to the information component) may be more appropriate as an assessment of attitude changes than placing it after the provision of information about the technology. One consequence of this for the results of this trial is that the pre-post differences are likely to include the combined effect of information and social interaction.

Another important influence is that participants made their responses to the first questionnaire based on ignorance about the reminder system, and may therefore have over- or under-estimated the potential impact of the reminder system. The changes in the responses to the three items noted above are consistent with the idea that participants started with a stronger belief about the impact of the reminder system than they had at the end of the discussion. Given this, and the potential problem raised above, it might be appropriate to trial the use of three questionnaires during the discussion groups; a pre- and post-questionnaire as described earlier, and an additional questionnaire with only the repeated items (those presented in Figure 11) placed at the end of the information session but before the actual group discussion. This would allow measurement of the separate effects of providing information and the group discussion as well as measurement of the overall effect. The only concern with this approach is that it adds another questionnaire to the study, and the additional measurements may have an effect on the attitudes of participants.

Another potential influence that was not considered in the development of the pre- and post-questionnaires is the possibility that seat belt non-use in Australia is mostly related to inconsistent usage patterns rather than clear non-use. Some comments in the group discussion suggested that participants, although they were identified for their inconsistent seat belt use, did not necessarily see themselves as clear non-users. It is possible that their responses did not change substantially during the group discussion because it may not have convinced them that they were the targets of the system. This is not to say, however, that their inconsistent seat belt use will remain unaffected by the reminder system. Its effect, however, may be more subtle for inconsistent users – resulting in earlier seat belt use rather than a complete change in seat belt use behaviour.

This raises an issue that is not often considered in the use of questionnaires as a measurement tool. Behaviour is often automated and not under conscious control. In the case of seat belt use, for example, it seems appropriate to suggest that drivers are cued to use their seat belt by cues in the vehicle or driving environment and that different drivers may be cued in different ways – by different stimuli or at different times. Those drivers cued later would be the inconsistent seat belt users identified here. The pre- and post-questionnaires sought to measure reactions to the seat belt reminder system by asking participants to respond to items about how they thought they would react. It is possible that making conscious ratings of this type does not access the psychological processes that drive behaviours such as seat belt use. An additional approach that might better access these processes may be to repeat the behavioural items in the pre-questionnaire (those that asked for the percentage of time restraints were used in different driving situations) in the post-questionnaire, but using an introduction that asks respondents to imagine how they might use their seat belts in a car with a reminder system fitted. It is recommended that this be trialled in any future application of the assessment method as it may better-assess likely behavioural responses to the reminder systems

E. DISCUSSION

The method recommended to assess the acceptability of seat belt reminder systems appears to have performed reasonably well. The recruitment successfully targeted non-users of seat belts, the presentation was well understood, the group discussion was accepted by participants and perceived to be a realistic discussion, and the pre- and post-surveys collected data that are likely to be important for understanding both seat belt use and the acceptability of the reminder systems (see Chapter 8). There is a need, however, to trial additional items in the post-questionnaire to further assess likely responses to the reminder system.

Given the apparent success of the method, it is recommended that it be applied in other jurisdictions (with the changes suggested in Chapter 10) and as a tool to investigate the likely acceptability of other ITS technologies (given the comments in Chapter 11).

There is a need, however, to validate the results of this type of method against acceptability data collected with use of the technology in the real world. The assessment method trialed here uses an explanation of the technology, uses a social simulation, and seeks information about likely reactions to the system. It is possible that reactions to the technology when experienced in actual use may differ from the predicted reactions. This is a difficult issue. Acceptability cannot easily be assessed in short-term trials using volunteers who are likely to have an interest in technological innovation.

One key advantage of the method discussed here is that it is able to estimate acceptability across a broader range of people than might be the case in an actual trial of the system.

Particpants were asked to rate their agreement to a number of statements about their ability or comfort with technologies such as computers, the internet, and mechanics, using the 11-point scale used for other rating items in the pre-survey and post-survey. Average ratings for these items were near to the centre of the rating scale, with ratings covering the full range of possible responses. Volunteers for *in-situ* trials of ITS technologies are likely to be biased towards people with a stronger level of comfort with technology.

The validation of this approach to assessing acceptability will most likely need to involve surveys of users as the technology spreads through the broader driving community. Until then, the assessment method should still be a useful tool in the development and refinement of a range of ITS devices.

CHAPTER 9: SEAT BELT USE AND ACCEPTABILITY

A. OVERVIEW

Although primarily conducted to develop, refine, and trial a method to assess acceptability of seatbelt reminder systems, the project did result in the collection of a substantial amount of data relevant to seat belt use and likely acceptability of a reminder system in Australia, The results are presented in Chapters 6 and 7. This Chapter summarises those results and draws some general conclusions about these issues in the Australian context.

B. SEAT BELT USE IN AUSTRALIA

The telephone survey results suggested that there were three factors underlying responses to the seat belt related items in the survey, and that there were three identifiable groups of participants. Two of the groups had relatively high average seat belt wearing rates, and the third group had a relatively low average wearing rate. Although these groups clearly differed, all three groups included participants who met the criterion for inclusion in the discussion group and who had relatively low average wearing rates.

The results suggest that seat belt wearing has a strong habitual component. Habit-related motivations were rated as strong influences on seat belt use, and ratings of the strength of habit-related motivations were strongly correlated with seat belt wearing rates. Forgetfulness and taking short trips were strong motivators for non-use. Attitudes that might be viewed as strongly opposed to seat belts were not apparent either in the discussion groups or in the telephone survey. Although this may (in part) reflect biases in the sample away from people strongly opposed to seat belt use, it does suggest that such attitudes are rare.

The discussion group results suggested that the participants who were less likely to wear seat belts than others in the survey sample, still tended to wear their seat belts in most driving situations. Seat belt wearing was lowest in slow-manoeuvring situations and when driving on quiet, residential streets. Otherwise, seat belt wearing rates were reported to be consistently high. This suggests that non-wearers (as far as this sample represented non-wearers) may be similar to wearers in their use of seat belts in most driving circumstances, but that they may differ in their use of seat belts in situations perceived to be less risky.

This result is an important one if it accurately reflects the situation for seat belt non-users in general. It is underscored by the comments many discussion group members made about their own seat belt use. In spite of their responses to the telephone survey and the pre-survey, many participants commented that they were regular seat belt users and that they did not think they needed to change their seat belt behaviours. There appears to be a perception amongst the non-users involved in the discussion groups that failure to use a seat belt in slow-manoeuvring actions and when driving on quiet, residential streets does not constitute non-use of seat belts.

This represents an interesting problem from a behaviour change point of view, and a particular challenge for the seat belt reminder systems as many situations in which non-users drive without a seat belt are unlikely to result in the activation of the reminder system. For these non-users, then, the reminder system will activate when driving on residential roads without a seat belt and so encourage seat belt use in this situation, but will not activate in the other,

slower driving situations. It might be predicted that this will result in an increase in seat belt use on residential streets for these people, but the effect in other situations is uncertain.

The results suggest that average wearing rates are not related to beliefs about the importance of seat belts. Respondents rated the importance of seatbelts and a statement that people should wear seat belts in the post-survey. The correlations between these items and the seat belt wearing data from the pre-survey were not significant. Taken together, this result and the situational wearing rates discussed above support the importance of the role of habit in seat belt use. General attitudes to the importance of seat belts were not related to actual seat belt use, suggesting that the use of seat belts is more strongly controlled by automatic processes than conscious ones.

The potential role of habit in seat belt use is consistent with the Recognition Primed Decision making model discussed in Chapter 3. This model emphasises the role of habitual behaviours generated by specific situations, and the results reported above are consistent with a view that seat belt use is a habitual behaviour that is evoked by specific situational cues. For participants in the third cluster in particular, seat belt use appeared to be situationally determined. Figure 17 shows the average seat belt wearing rate for the slower driving actions for each cluster.

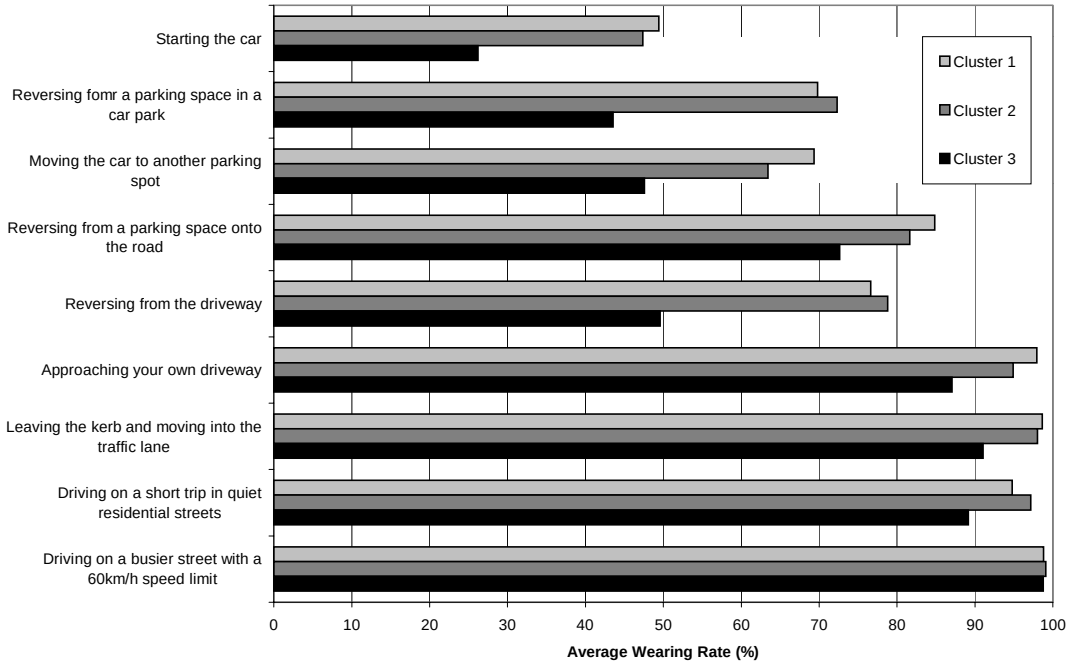

Figure 17: Average seat belt wearing rate for slower driving actions, disaggregated by cluster membership

The seat belt usage rate was lower for all participants in slower driving situations, but this was particularly noteworthy for the members of the third cluster. What is also noteworthy, however, is that seat belt wearing rates for all participants (even thought they were recruited for their poorer-than-average seat belt use) were quite high in faster driving situations. This result was consistent for the remaining (ungraphed) items, all of which involved faster driving.

One interpretation of this finding is that consistent and inconsistent seat belt users differ from each other in the extent to which they have developed habitual seat belt use that is generated in slow-movement (and residential driving) contexts. This has important consequences for seat

belt programs in general, and for the seat belt reminder system in particular. It may be useful to target seat belt use at the kerb as a target behaviour for both general programs and the reminder system – the idea being that early generation of habitual seat belt use (rather than the late generation of habitual use suggested in the results) may act to increase seat belt use in general amongst inconsistent users.

For the seat belt reminder system, this suggests that it may be useful to provide a clear warning for non-users as the vehicle starts to move. This, if annoying enough, may act to encourage the development of an early seat belt habit as a way to avoid the warning.

C. ACCEPTABILITY

The results of the discussion groups suggest that the seat belt reminder system will be well accepted by Australians. The immediate reactions to the presentation about the system were generally positive. Although some participants raised concerns, there was general agreement in the discussions that the reminder system would be a positive road safety measure. In the post-survey, participants indicated that they felt positive about the system.

The discussion group, intended to simulate the social processes likely to occur with the introduction of the reminder system, resulted in more-positive feelings about the reminder system and did not encourage participants to consider attempting to disconnect or avoid the system. When asked in the post survey how strongly they agreed with some concerns about how others might respond to the system, participants' agreement with statements about people disconnecting the system was generally weak.

The discussion itself did raise a number of issues that might be expected to influence the acceptability of the devices. These included the following:

- Reliability: Participants were generally concerned about the reliability of the technology. Many had experienced problems with in-car technologies or were aware of people with this type of experience, and were concerned that the addition of another, complex technology might result in more problems. There was a widespread lack of trust in technology. Participants generally thought that the devices would need to be perfectly reliable – they were not prepared to accept failures in the technology and were particularly concerned with the possibility that the reminder system might malfunction and make it difficult to continue driving the vehicle. Some commented that this could be a problem in remote areas where repair facilities may not be nearby.

- Repairs: The availability of qualified repairers was viewed as a concern, given concerns about potential problems with the technology. Some participants were concerned about the potential costs of repairs. It was suggested by some groups that a long-term warranty might allay some fears about the technology and repairs.

- Price: Participants were generally concerned about the potential price increase associated with the addition of the seat belt reminder system. Although positive about the benefits of the technology, increases in purchase costs would be unpopular.

- Complexity: Some participants were concerned about the added complexity for drivers. This concern was expressed more strongly in the context of other potential ITS technologies, but some participants felt that another warning system might make the driving more complex for some drivers – particularly older drivers.

Although the devices were acceptable to participants of the discussion groups, it is possible that this level of acceptability may not survive any publicised problems with the technology.

D. THE SEAT BELT REMINDER SYSTEM

Some of the issues raised by participants in the discussion are relevant to the design or action of the seat belt reminder system as taking them into account may make the system more acceptable or, possibly, easier to use. Some of these issues were as follows:

- Tone volume: Some participants raised concerns about the salience of the tone. Some felt the tone (as portrayed in the videotape) was too annoying, but most felt it was appropriate for unimpaired people. There were general concerns about the salience of the tone for hearing-impaired drivers, and for people with loud sound systems in their vehicles. A small number of participants wondered if the tone was annoying enough for people impaired by alcohol.

- Child restraints: Child seats and harnesses were a concern in every group, as many restraints rely on a constantly fastened seat belt as part of the anchorage system. It was felt that a smart technology that required people to fasten their seat belt after sitting in the seat may not cope with child restraints. The idea of having some minimum weight below which the reminder system would not be activated was discussed in most groups, but this raised additional concerns about the usefulness of the system for parents whose children may be using normal seat belts but be under the minimum weight. Some participants suggested a flexible approach to setting weight sensitivity in the system, perhaps allowing qualified vehicle mechanics or auto-electricians to make changes to suit the changing needs of families with children.

- Upgrading of other components: A number of participants were concerned about potential problems upgrading other equipment in the car. The possibility that upgrading a sound system, for example, might interfere with the operation of the reminder system was discussed, and participants generally agreed that the system should be flexible enough to allow vehicle owners to make changes to their vehicles.

- Pets and parcels: Some participants were concerned about their ability to carry parcels, luggage, and pets (such as dogs) in their cars. They were concerned especially about larger dogs that might move around the rear seat of the car, even when restrained.

- Alternate systems: The potential for the seat belt reminder system to use stronger reminders or to interfere with driving the vehicle in some way was discussed in most groups. In some cases, some participants thought it would be better if the seat belt reminder systems acted as an interlock device, but this opinion was not supported by most discussion group members. This was particularly apparent in relation to other ITS technologies which were discussed in some groups. It was clear that most participants were uncomfortable with technologies that might interfere with their ability to drive and control the vehicle. The reminder system as proposed appears to be a good compromise between a strong intervention (likely to be unacceptable to drivers) and an ineffective system.

In general, however, participants were very positive about the system, indicated that they would not seek to disconnect or avoid it, and said that they would not attempt to avoid purchasing a car with it installed. Participants were either sure that they would not need such a system and, therefore, that it would not affect them but was a good idea anyway, or they agreed that such a system would help them to become less forgetful about seat belt use.

Participants mostly thought that the system would help to develop earlier seat belt habits in people – that drivers would use their seat belts to avoid the annoying tones. Some groups discussed the effect of these devices on people who used both new and older cars. While a small number of participants wondered about the possibility that over-reliance on the warning tone might reduce the amount of seat belt use in older vehicles in these circumstances, most participants felt that the habit developed with the reminder system would carry over to other vehicles. Some suggested that the absence of a warning tone might, itself, act as a reminder to people who failed to use a seat belt in older cars after contact with the reminder system.

There is still a strong need to conduct additional research to investigate a number of issues, including the best warning sound (pitch, volume, sound profile) in terms of its ability to capture attention and to annoy the driver and passengers without interfering in the driving task, and the actual behavioural response of people once the reminder systems are fitted. The former issue will most-likely require access to vehicles fitted with prototype reminder systems that are programmable. The use of a simulator is not advised as there is a need to assess the potential impact of different system configurations in the context of real-world driving. This study would also require access to a large pool of potential participants who are inconsistent seat belt users.

The latter issue (the behavioural response of drivers to the reminder system) would need to be addressed carefully. Current trials of ITS technologies in a number of jurisdictions are unlikely to be generalisable to the broader driving community for a number of reasons. It would be important to avoid this problems in any assessment of the reminder system.

CHAPTER 10: USE OF THE METHOD IN OTHER COUNTRIES

The method recommended here for the assessment of the acceptability of seat belt reminder systems was developed primarily to be applied in Sweden and, potentially, other parts of Europe. While the method appears to work in the Australian context, there are a number of important issues that need to be addressed in applying it in other cultural contexts. Some of these are discussed here. While some do not affect the method itself, they all impact on the likely openness of people in the community to involvement in the method and their likely acceptance of, or willingness to consider the technology.

A. ATTITUDES TOWARDS SEAT BELTS

Seat belt wearing rates in Australia are consistently high. Jurisdictions in Australia were generally early to require seat belt use in motor vehicles, and Australian drivers have generally taken up seat belt use without the need for ongoing strong enforcement or public education programs. Public education programs are now generally targeted towards subgroups of drivers and passengers with lower than average seat belt wearing rates rather than the broader community.

The data presented earlier suggest that even a group of drivers who were identified as less likely to wear a seat belt have self-reported usage rates in excess of 95% in most driving situations. The data presented in this study were interpreted (in part) to suggest that seat belt use is a situationally-determined habitual behaviour. The results suggest that the difference between consistent and inconsistent users may be the situational cues that lead to seat belt use. Regardless of actual behaviour, all participants had strongly-positive attitudes towards the importance of seat belts.

The wearing rates in other countries are likely to be lower than those in Australia, and it is possible that non-users in other countries may include more consistent non-users than seems to be the case in Australia. Consistent non-users present a more serious challenge for this method, as they may be more resistant both to the technology and to being involved in a survey or discussion group. Results from Sweden suggest that non-users there may be similar to those in Australia – mostly people who have failed to develop an appropriate seat belt habit rather than people opposed to seat belts – but the application of the method in other countries may be more difficult.

It is strongly recommended that a preliminary study of seat belt usage, motivation, and attitudes be conducted to assess these issues prior to applying this method. Without this initial information, it may be difficult to assess whether discussion group participants are a good cross-section of the non-using, driving population. This type of study may be incorporated into a larger pilot of the recruitment survey and method to assess refusal rates among different sub-groups of users and non-users.

B. ATTITUDES TOWARDS AUTHORITY AND REGULATION

Australians have generally been quite accepting of the involvement of regulatory processes in traffic management and road safety. In addition to early legislation concerning seat belt use, some Australian States have extraordinarily strong enforcement programs focusing on drink driving (including random breath testing since the late 1970's) and speeding (including automated enforcement and an assumption that the owner of a vehicle is responsible for driving offences detected by speed-detection cameras).

This general acceptance of legislative involvement may impact on the willingness of drivers to take part in a discussion group program such as this one, and will almost certainly influence their opinions about a device designed to annoy them into using a seat belt.

Attitudes towards regulation and legislation in Sweden are likely to be similar to those in Australia, and it is probable that the Swedish attitude towards the community-good is more positive than that in Australia. This is likely to make the use of this method in Sweden relatively easy. In other countries, however, any animosity or mistrust towards regulatory approaches to road safety may make it more difficult to recruit participants. This may be a particular problem in countries where there are sub-groups of the population with different attitudes towards authority. It would be important to find ways to ensure that the discussion groups are not biased towards people with positive attitudes.

Any negative attitudes towards authority may also influence the discussion process if there is a perception that the groups are linked to regulatory bodies. Some participants may use the group (consciously or otherwise) as an opportunity to communicate their general attitudes rather than their specific response to the technology in the vehicle. It would be important, therefore, to have a relatively independent group conduct any research involving this method.

C. COMFORT IN A GROUP

Discussion group methods rely on the willingness and ability of participants to state their attitudes and reactions in a relatively public forum. This has implications both for the recruitment of a cross-section of people and for the discussion group itself. While these differences are inter-personal rather than strictly cultural, some cultural contexts may impose difficulties on involvement in discussion groups. Cultures that have a strong paternalistic structure may, for example, restrict the ability of women to express themselves in a group – either explicitly or through social learning processes – especially where the facilitator is male or there are males in the group.

Recruitment would be influenced by this if some sub-groups of the population refused to participate because of their discomfort in a group discussion. The group process itself would be influenced by the presence of less extraverted participants, and there is risk that a discussion group may not sample the full range of opinions held by group participants.

Application of the method under these circumstances would require careful recruitment of participants – allaying the fears of potential participants and perhaps providing discussion group formats that match the cultural expectations of participants in terms of facilitation and group membership.

These are not likely to be issues in Sweden.

D. SAMPLING

The initial sampling of potential group members in the trial reported here relied on random number telephone surveys conducted in suburbs with a range of socio-economic characteristics. This method was used as most Australian households have a telephone (across socio-economic groups), and alternative recruitment methods involving sampling from seat belt offenders or non-users would have been inefficient because of the high seat belt wearing rates amongst vehicle occupants in Australia. Australians are also generally used to the concept of telephone-based market research. The situation is likely to be similar in Sweden, leading to a recommendation that this recruitment method be used there.

In other countries it may be more feasible to use road-side or similar recruitment methods if wearing rates are lower. This approach might be particularly appropriate in countries with less household access to telephones. Drivers could be stopped – say when parking their car – and (depending on their use of a seat belt) asked to take part in the discussion groups. Some additional questions could be asked at that point. This method is likely to be reasonably efficient in a low-use context, but would have to be carefully planned to avoid potential sources of bias in the recruitment arising from the choice of locations and selection of potential participants.

Concerns about sampling also extend to sampling biases arising from cultural issues concerning gender and age. Cultures where women or some age groups are less likely to drive in areas where roadside recruitment is occurring, or where the same groups are less likely to respond to telephone surveys are also likely to be problematic. It may be appropriate to set recruitment quotas in these environments, perhaps loosely based on driving exposure data where these are available.

E. ATTITUDES TOWARDS TECHNOLOGY

Australian acceptance of technology is high, with high levels of penetration of mobile telephones and home computers. Sweden is likely to be similar. Even in the Australian trial, however, there were many group discussion participants who expressed some concerns about the technological focus of current developments, and it was clear that there were people with quite limited comfort with technology in the groups. While these negative attitudes did not dissuade people from joining the discussion groups, there is a risk that negative attitudes towards technology in less-technological cultures may discourage some potential participants.

This is an important issue. The method attempts to assess the likely reaction of people to the new technology, and the broad range of reactions needs to include those from people less inclined towards technologies. These people are likely to be the ones who are less willing to accept the inclusion of ITS devices in motor vehicles.

This is a similar problem to that outlined earlier in relation to *in-situ* trials of ITS technologies which are unlikely to include people with negative attitudes towards technology and which are therefore likely to result in positively-biased results.

F. RECOMMENDATIONS

It is considered important the method be applied in Sweden and elsewhere. The results of this trial, while promising, are relevant to the Australian context and may be poor predictors of results in other countries.

There are likely to be very few differences between Sweden and Australia that would be expected to cause problems in the application of the method. It is recommended that an initial trial of the same method be conducted, with a relatively small recruitment survey and a small number of discussion groups, perhaps drawn from a number of suburbs of one of the larger cities.

Assuming the method appears to work in this context, the application of the method in Sweden should incorporate residents of smaller communities and remote areas in addition to urban participants. One weakness of the trial reported here was that it failed to include participants from rural and remote areas in Australia. It is quite likely that seat belt related motivations and the acceptability of an ITS technology would be different for residents of rural areas, and similar differences are likely in Sweden. This makes it necessary to include people outside the larger cities, perhaps recruited in proportion to census data.

Ideally, the recruitment survey and the pre- and post-surveys used in the group sessions would match those used in Australia and, where possible, other countries. The opportunity to assess differences between countries is important given the international nature of the motor vehicle industry.

Use of the assessment method in other countries is likely to be more challenging than would be the case in Sweden or other Scandinavian or Northern-European countries where there is a strong safety-oriented culture and strong values oriented towards the community-good. Using the method in other countries, however, is important. Given the lower seat belt usage rates in Southern Europe and parts of the United States, for example, the acceptability of the seat belt reminder system is likely to be critical for its success. Understanding the factors associated with potential low levels of acceptability should help direct the introduction of the devices.

The issue of validation of the method as a predictor of actual acceptability still has not been adequately addressed. It would be important to seek opportunities to do so. It was noted that *in-situ* assessment of acceptability in a trial program is difficult because of the potential bias towards people interested in technological developments in trials of ITS devices. There are two potential solutions to this problem. One would be to find ways to extend the trial methodology to incorporate a broader cross-section of the community. How this could be done is uncertain. Some current research in Australia proposed to place a fleet of ITS-fitted vehicles in corporate fleets, but there are also bias problems here.

The other potential solution is to wait until the seat belt reminder systems start to enter the broader community and then collect acceptability data from vehicle owners. Although collecting the data in this way would result in a bias towards new-car buyers, it would at least provide data from normal use. The weakness with this suggestion is that it would not provide a validation of the acceptability results until the technology is already in production. It is difficult to see how this problem could be solved.

CHAPTER 11: APPLICATION TO OTHER SYSTEMS AND TECHNOLOGIES

The method outlined here was applied to an ITS technology without having access to the technology itself. Given the potential (but somewhat unrecognised) importance of acceptability in the development of ITS, it is possible to use the method developed here to assess ITS acceptability more broadly. The validation issue is potentially more important in other ITS areas because of the likelihood that drivers will be less familiar with the technologies. In the case of the seat belt reminder systems, drivers were familiar with seat belts and most were familiar with different types of less intelligent seat belt reminder devices in modern cars. Explaining the new reminder system was relatively easy compared to the potential problems explaining devices such as automatic cruise control or intelligent speed adaptation technologies.

This difficulty does not rule out the application of the assessment method trialed here for seat belt reminder systems to other technologies. It does underscore, however, the need to take additional care in that part of the assessment method that involves explaining the technology to participants. The use of aids such as video material and, perhaps, interactive materials and demonstration prototypes would be essential.

It is recommended that a number of stages should be followed to apply the social processes simulation approach to other ITS technologies:

Problem identification

The behavioural issues addressed by the ITS technology should be identified. This would most likely have occurred with the development of the functional specifications for the technology, but there needs to be some explicit definition of the problem behaviours.

Problem investigation

There is a need to understand the behaviour targeted by the ITS technology, as factors associated with the behaviour are likely to play a role in the acceptability and use of the technology. The motivational factors associated with the target behaviour can be assessed in the recruitment survey or just for those involved in the discussion groups, but the development of items in these surveys relies on some initial understanding. In this context, it is also important to understand the target behaviour in terms of the psychological or cognitive processes that might underlie it.

It is worth noting in this context that our general understanding of the psychological and cognitive processes underlying most safety-related behaviours is very poor. Given that the ITS technologies are intended to influence these processes, it is one potential weakness of the ITS approach that it hasn't given enough attention to understanding the behaviour itself.

Recruitment

The method trialed here relied on recruiting people who were more likely to engage in the target behaviour than others in the general population. This approach is only recommended for other ITS technologies where the technology is designed to be invisible to the well-behaved user. In cases where the technology has a broader impact (as may be the case for technologies such as forward collision warning devices, for example), it is recommended that a broader range of people be recruited for involvement in the discussion groups.

	Recruitment could involve a range of techniques. In countries like Australia and Sweden, random number telephone surveys with recruitment criteria built into the survey are probably appropriate.
Discussion Groups	The discussion session has two aims – to provide enough information to the group to allow a meaningful discussion, and to encourage some of the social interaction likely to occur with the introduction of the new technology. The information component should be planned to provide information at a functional rather than technical level, and should provide the information in a way that targets the least technically-skilled members of the discussion group. The discussion group needs to be planned with some specific issues in mind, but needs to be conducted in a way that encourages input from all members of the group and that attempts to simulate a relatively free discussion (as far as is possible in a relatively artificial environment).
Data Collection	As well as providing an opportunity to collect more-detailed data from people, the group discussion aims to simulate a social process and then collect data from individuals. The collection of individual information after the social process is important as behaviour occurs at an individual level, regardless of the social influences brought to bear by peers and others. Ultimately, the acceptance and correct use of ITS technologies depends on individual behaviour, which should be assessed as part of this method.

In the specific case of an intelligent speed adaptation device, for example, this process would involve the following:

- Identification of the problem behaviour targeted by the technology: In this case the behaviour is clearly excessive speed, although the device under consideration in some areas targets speeds greater than the local or posted speed limit.
- Understanding of the problem: This is a difficult issue in the speeding domain. In addition to understanding the external cues and internal factors associated with speeding (including motivational factors), there is a need to have an understanding of the psychological and cognitive processes that link these factors to speeding behaviour as these will be the processes influenced by the technology. In the case of speeding this may require the development of new psychological and cognitive models.
- Recruitment: A recruitment process would need to be devised, most likely including recruitment from the general population and a separate sampling process to ensure adequate representation of speeding drivers.
- Discussion Group: The information component of the discussion group for intelligent speed adaptation devices would need either a comprehensive (but short) video or perhaps (and of more value) an opportunity to look at a prototype. As noted above, ITS technologies like an intelligent speed adaptation device are both complex and outside the common experience of drivers, necessitating more care in providing information than might be the case for other technologies. The discussion component would probably not need to differ too much from that used in the seat belt reminder system discussion group.
- Data: The data collection might include a focus on detailed data about the situations under which drivers exceed the speed limit, and would need to focus on tampering issues as this type of technology is likely to produce negative reactions amongst drivers.

CHAPTER 12: CONCLUSIONS

A. SEAT BELT USE AND THE REMINDER SYSTEM

It will be recalled that Chapter 1 included a model similar to that in Figure 18. In Figure 18, emphasis is given to the components of the original model that were supported in the current study.

The original model suggested that there would be two groups of seat belt non-users, but the data collected during the project suggested (for Australian drivers) that it might be more appropriate to regard non-users as inconsistent users rather than consistent non-users. This is unlikely to be the case in most other countries, however. The cluster analysis of the survey data, and the responses of group-discussion participants to the pre-survey, suggested that most of the non-users identified in the study wore seat belts in most day-to-day driving activity and tended not to only in slow-driving or residential driving situations.

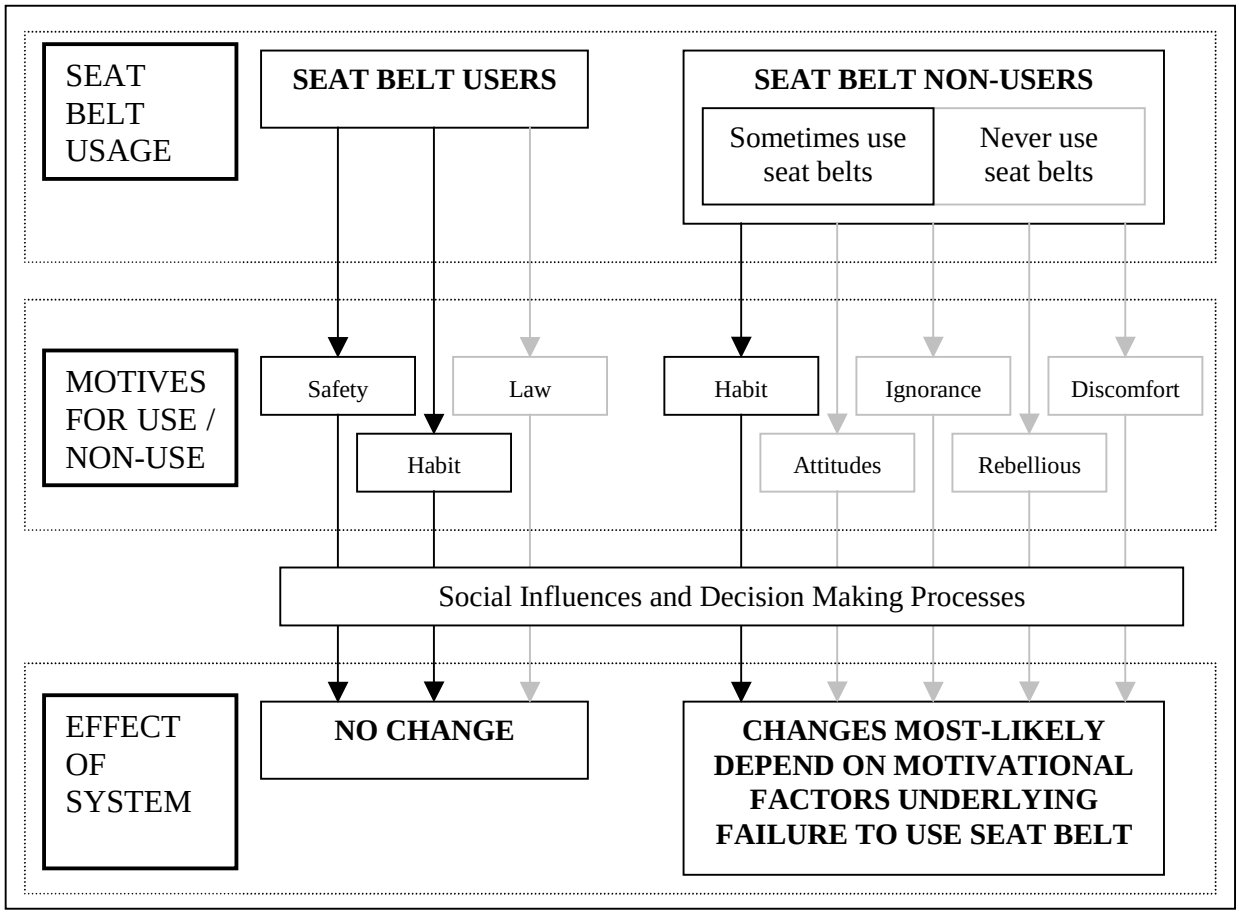

Figure 18: Modified General Model of the Effect of Reminder Systems

The motivational factors associated with seat belt use were habit and, less so, safety. Law-related motivational factors appeared to be important for some non-users, but this was uncommon. The importance of habit was a constant theme in the analyses of both the telephone survey data and the pre-survey data. Habit was the only motivational factor associated with non-use in Figure 18 that appeared consistently in the data. There was little if any evidence that non-users had negative attitudes towards seat belts, that they were ignorant of the importance of seat belts, or that they were uncomfortable wearing seat belts.

The role of habit is an important finding here. Seat belt behaviours appear to be habitual, and the findings suggest that the habit is associated with driving in specific contexts. Seat belt use amongst the group identified as less likely to wear seat belts was poor in some situations but was quite high in normal driving situations where the risk of injury in a crash would be substantial without a seat belt. For these drivers it is possible that the situations that trigger the seat belt habit are different to those that trigger seat belt use in others drivers. This result is a positive one for the seat belt reminder system as it can potentially act as part of the driving context that reminds drivers to use seat belts earlier.

The role of habit in seat belt use was discussed in Chapter 3 when the recognition primed decision making model was introduced. This model views seat belt use as a habitual behaviour primed by situational cues – a view that is quite consistent with the data collected in this study. Under this model, developing a new habitual behaviour or changing an existing habitual behaviour requires experience with the new behaviour. The seat belt reminder system, by strongly encouraging seat belt use earlier in the drive, will encourage the formation of seat belt habits through experience. The potential value of the seat belt reminder system is therefore supported by the data collected here and the general model of underlying processes suggested earlier.

The social processes simulated by the assessment method did not result in stronger negative reactions to the seat belt reminder system. The discussion tended to reinforce people's already-positive response to the technology, given their general claim that their seat belt non-use related primarily to forgetfulness rather than any negative attitudes towards seat belts.

The discussion groups (along with some previous research) indicated that reliability was an important issue for the technology's acceptance by drivers. There were general concerns raised by many participants that they would be less accepting of the devices if they were unreliable. Participants appeared to agree that the devices would need to be perfectly reliable and covered by a lifetime warranty of some sort in case there were problems.

B. THE METHOD

The method proposed to assess acceptability of the seat belt reminder system appeared to perform well. The recruitment method resulted in the recruitment of group discussion participants who were less likely to use seat belts. The information provided to participants in the group discussions was well understood, and the group discussion seemed to work well and was generally viewed as realistic by participants.

The application of the method to other countries and to assessment the acceptability of other ITS technologies was discussed in Chapters 10 and 11. In both cases it was recommended that the method as used here could be used with some additional care given to some issues.

The assessment method here provides a general model for the assessment of potential reactions to any technology where decisions during the development phase are likely to influence the final acceptability of the technology. Although there is a need to validate the technique, it appears to provide a method that might be of general use. Its reliance on the simulation of social processes means that it is likely to better take into account the natural social interactions that occur with new technologies. It can be contrasted with a survey technique, for example, which wouldn't be sensitive to the effects of peer pressure and other factors that tend to have a role in behaviour.

It is recommended that this be a focus of future use of the method, and that the failure to validate the technique in the short term not be viewed as a substantial problem. The development of new ITS technologies could be accompanied by an assessment of the potential acceptability of the device using this method, which in turn would provide information that could be used either to change the specifications of the device to make it more acceptable or to change the marketing of the device during its introduction to deal with specific concerns.

C. FUTURE RESEARCH

There are a number of issues for future research, including the following:

- Application of the method in other countries: This issue was discussed above in the context of the need to collect acceptability data in countries where the technology is likely to be introduced (such as Sweden), as an aid to the introduction of an effective technology. It is also likely to be useful to collect data on both seat belt motivations and the likely reaction of drivers to the seat belt reminder system in countries with different seat belt wearing rates. The introduction of seat belt reminder systems is likely to have a greater effect in countries with low seat belt wearing rates, but this assumes that the motivational factors leading to low wearing rates do not act against the successful introduction of the technology. Collecting seat belt and acceptability data from a range of countries is likely to assist developers to tailor the technology to a range of circumstances.

- Application to other technologies: As discussed above, the method could applied to other technologies.

- Validation of the method: This is a necessary research goal. In the case of seat belt reminder systems in Australia, the method suggests that the acceptability level is high, primarily as a result of the widespread positive attitude towards seat belt use and the involvement of habitual patterns of behaviour in non-use. The actual introduction of seat belt reminder systems in production-line vehicles will allow a test of the predictions made in this study. Similarly in Sweden, the use of the method will result in some predictions about acceptability in that context, which can then be tested with the introduction of the technologies in the vehicle fleet. The validation of the method is more likely to be achieved in Scandinavia given the current state of preparation for the introduction of seat belt reminder systems.

- Assessment of the effect of the reminder system: The seat belt reminder system is an early use of intelligent safety technology in production vehicles. Its reliance on annoying vehicle occupants who do not behave in a safe manner is relatively novel, and the move towards using ITS technologies to modify behaviour has not been fully evaluated. The inclusion of seat belt reminder systems, and their slow penetration into the vehicle fleet, needs to be evaluated in terms of its effect on seat belt related behaviours, safety-related

motivations, and injury. While such an evaluation will be long-term given that the technologies will be incorporated into new vehicles only, it is the first opportunity to assess the injury-benefits of an intelligent system that relies on encouragement rather than taking control from the driver or occupant. It is important in the context of an injury-based evaluation to incorporate measures of intermediate stages in the behaviour chain (such as motivational factors, acceptance, and seat belt use). Without this information, it would not be possible to assess the way in which the reminder systems affect injuries resulting from crashes.

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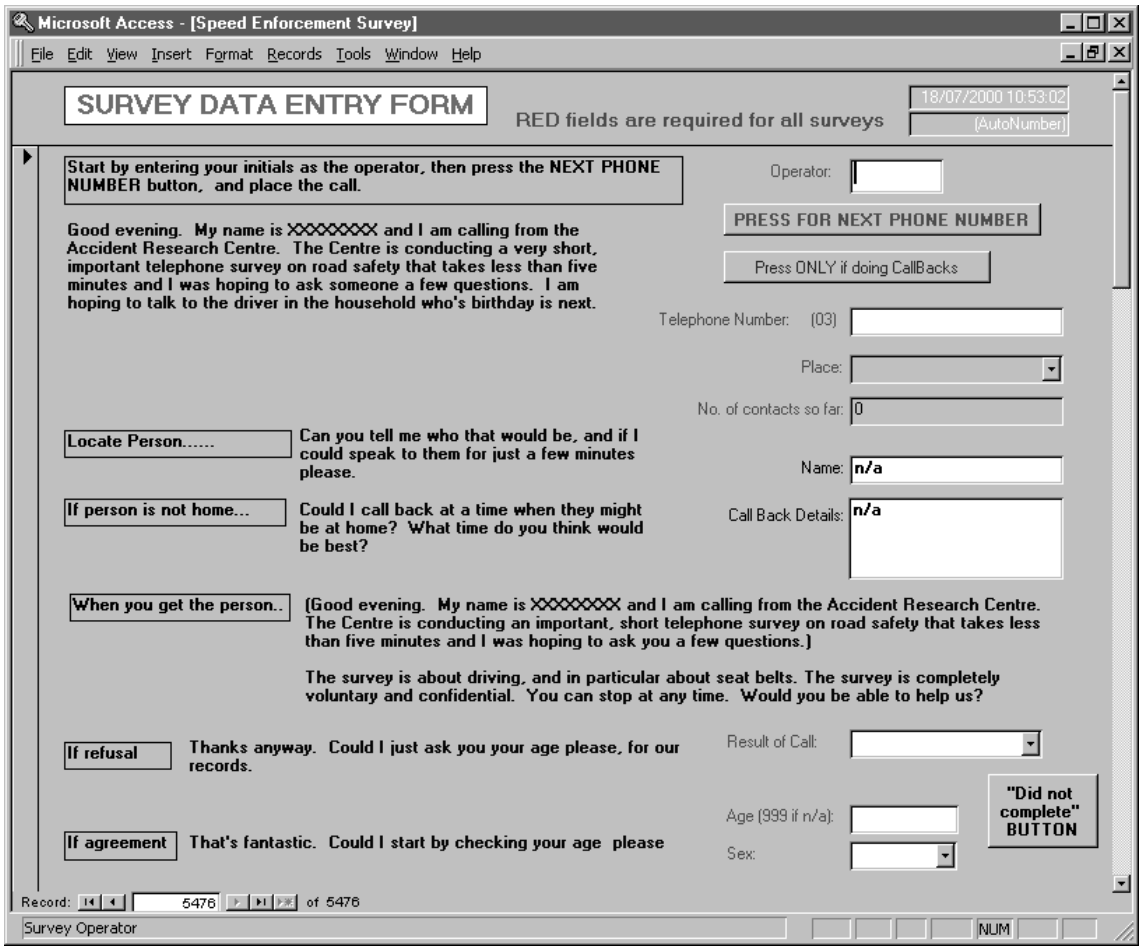
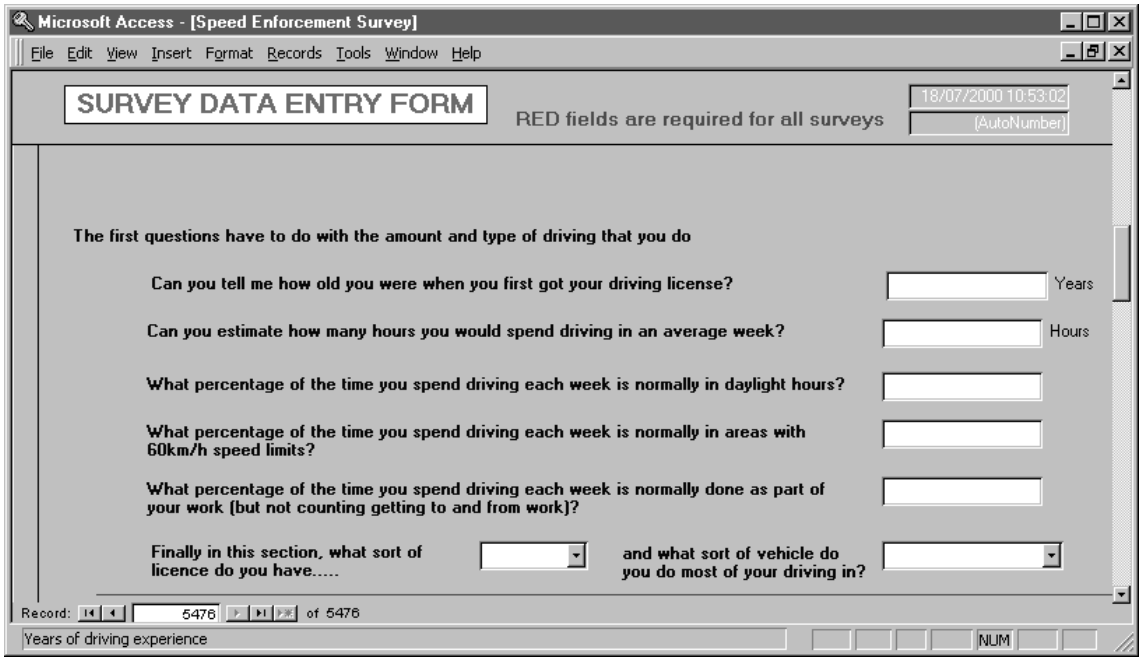
APPENDIX A: TELEPHONE SURVEY




Microsoft Access - [Speed Enforcement Survey]
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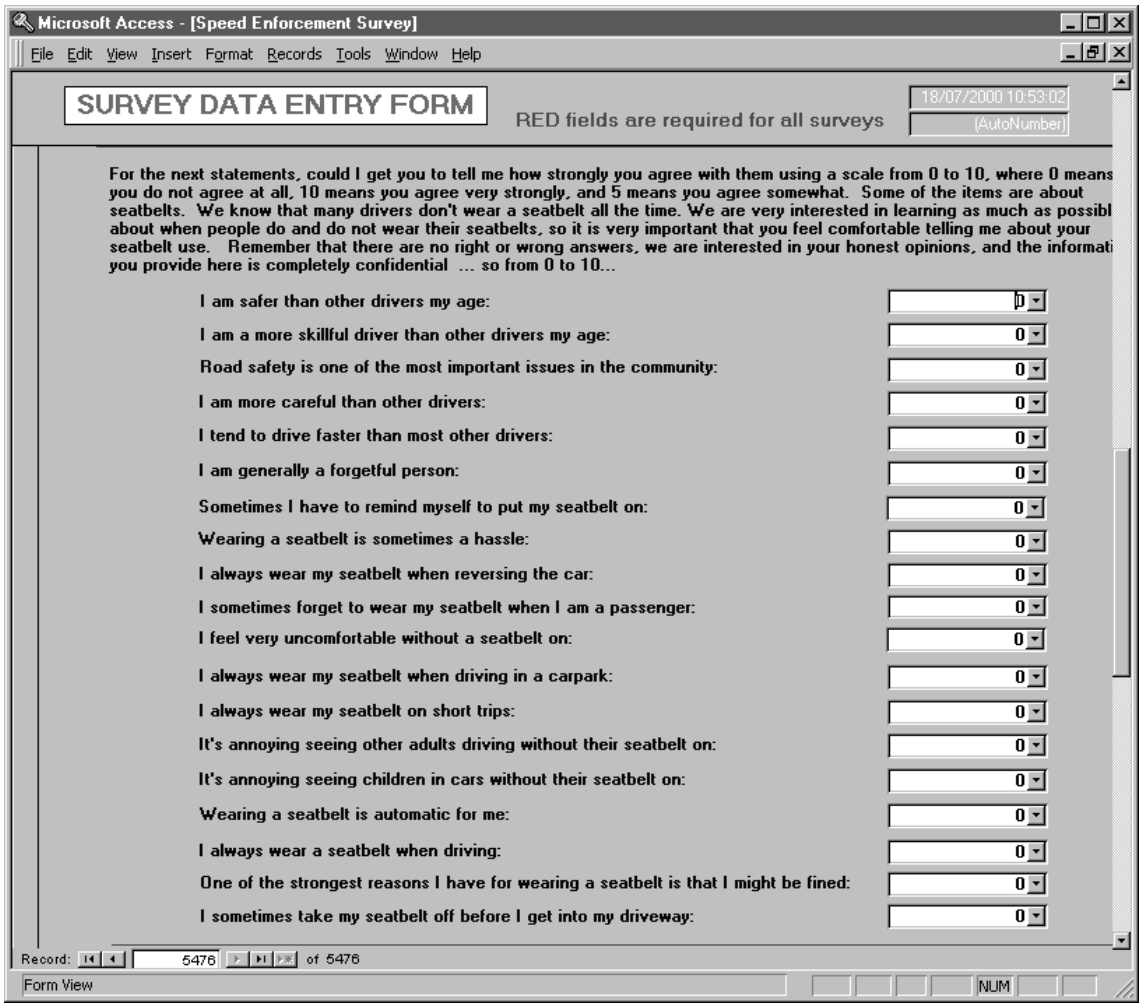
SURVEY DATA ENTRY FORM
RED fields are required for all surveys
18/07/2000 10:53:02
[AutoNumber]
The first questions have to do with the amount and type of driving that you do
Can you tell me how old you were when you first got your driving license?
Years
Can you estimate how many hours you would spend driving in an average week?
Hours
What percentage of the time you spend driving each week is normally in daylight hours?
What percentage of the time you spend driving each week is normally in areas with 60km/h speed limits?
What percentage of the time you spend driving each week is normally done as part of your work (but not counting getting to and from work)?
Finally in this section, what sort of licence do you have.....
and what sort of vehicle do you do most of your driving in?
Record: 5476 of 5476
Years of driving experience
NUM


Microsoft Access - [Speed Enforcement Survey]
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SURVEY DATA ENTRY FORM
RED fields are required for all surveys
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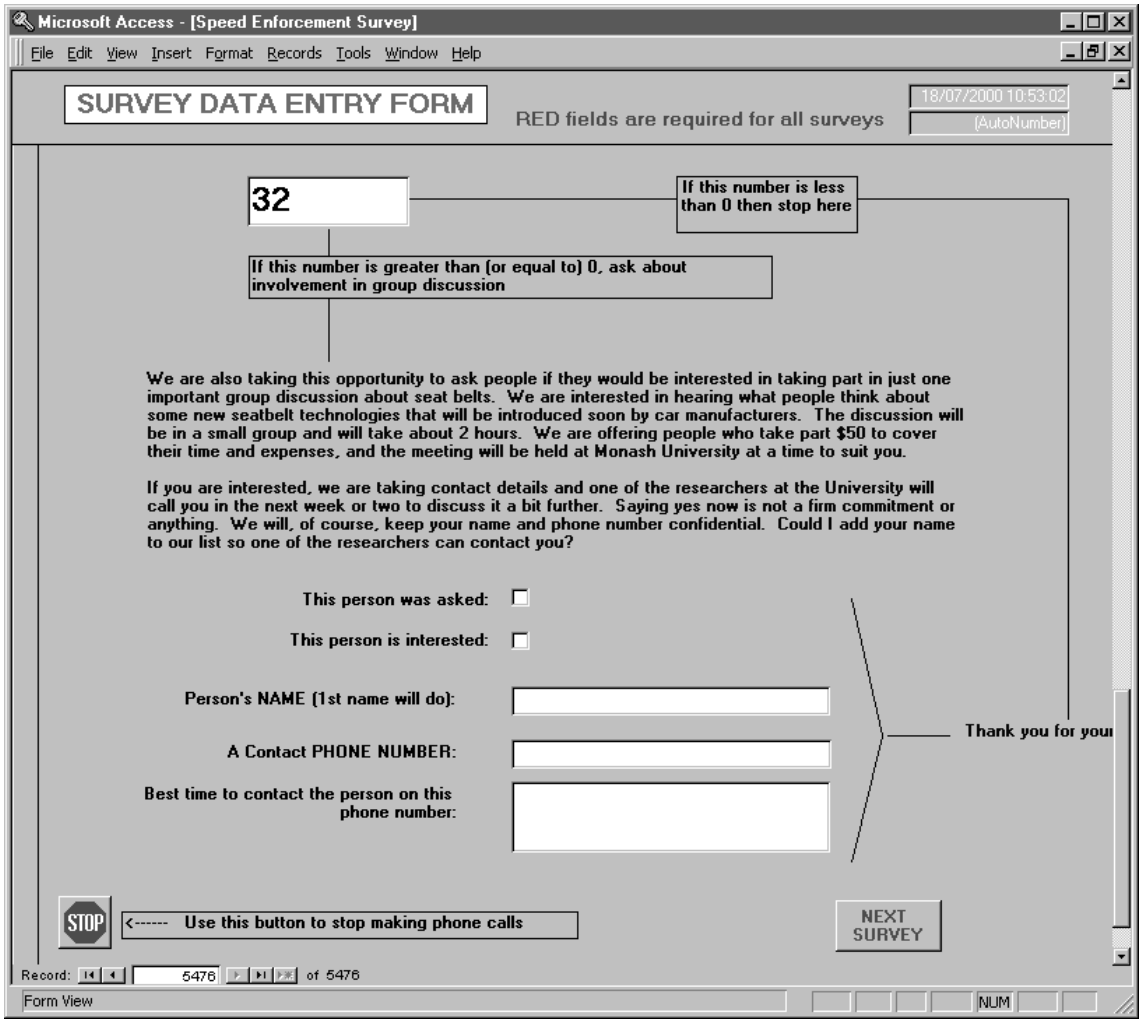
For the next statements, could I get you to tell me how strongly you agree with them using a scale from 0 to 10, where 0 means you do not agree at all, 10 means you agree very strongly, and 5 means you agree somewhat. Some of the items are about seatbelts. We know that many drivers don't wear a seatbelt all the time. We are very interested in learning as much as possibl about when people do and do not wear their seatbelts, so it is very important that you feel comfortable telling me about your seatbelt use. Remember that there are no right or wrong answers, we are interested in your honest opinions, and the informati you provide here is completely confidential ... so from 0 to 10...
I am safer than other drivers my age: 0
I am a more skillful driver than other drivers my age: 0
Road safety is one of the most important issues in the community: 0
I am more careful than other drivers: 0
I tend to drive faster than most other drivers: 0
I am generally a forgetful person: 0
Sometimes I have to remind myself to put my seatbelt on: 0
Wearing a seatbelt is sometimes a hassle: 0
I always wear my seatbelt when reversing the car: 0
I sometimes forget to wear my seatbelt when I am a passenger: 0
I feel very uncomfortable without a seatbelt on: 0
I always wear my seatbelt when driving in a carpark: 0
I always wear my seatbelt on short trips: 0
It's annoying seeing other adults driving without their seatbelt on: 0
It's annoying seeing children in cars without their seatbelt on: 0
Wearing a seatbelt is automatic for me: 0
I always wear a seatbelt when driving: 0
One of the strongest reasons I have for wearing a seatbelt is that I might be fined: 0
I sometimes take my seatbelt off before I get into my driveway: 0
Record: 5476 of 5476
Form View
NUM


Microsoft Access - [Speed Enforcement Survey]
File Edit View Insert Format Records Tools Window Help
SURVEY DATA ENTRY FORM
RED fields are required for all surveys
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(AutoNumber)
32
If this number is less than 0 then stop here
If this number is greater than (or equal to) 0, ask about involvement in group discussion
We are also taking this opportunity to ask people if they would be interested in taking part in just one important group discussion about seat belts. We are interested in hearing what people think about some new seatbelt technologies that will be introduced soon by car manufacturers. The discussion will be in a small group and will take about 2 hours. We are offering people who take part $50 to cover their time and expenses, and the meeting will be held at Monash University at a time to suit you.
If you are interested, we are taking contact details and one of the researchers at the University will call you in the next week or two to discuss it a bit further. Saying yes now is not a firm commitment or anything. We will, of course, keep your name and phone number confidential. Could I add your name to our list so one of the researchers can contact you?
This person was asked:
This person is interested:
Person's NAME (1st name will do):
A Contact PHONE NUMBER:
Best time to contact the person on this phone number:
Thank you for your
STOP
<------ Use this button to stop making phone calls
NEXT SURVEY
Record: 5476 of 5476
Form View
NUM

APPENDIX B: PRE-SURVEY FOR DISCUSSION GROUPS

P: D:

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE

INVESTIGATION OF ATTITUDES TO SEAT BELTS

This questionnaire is designed to find out some of your attitudes to wearing seat belts.

This page asks about your use of seat belts. In each driving situation, please show what percentage of the time you wear a seat belt by using a number from 0 to 100. 0 means you never wear a seat belt in that situation, and 100 means you wear a seat belt 100% of the time. Higher numbers mean you wear a seat belt more often. There are no right or wrong answers. We are interested in knowing what you normally do in each situation.

Please enter a number in every space

Situations	When you are the **driver**								When you are a **passenger**
	Different times of the day			Different weather		Who is in the car			
	Day	Evening	Late Night	Dry	Wet	Just yourself	A same-sex friend	Family members	
Starting the car									
Reversing from a parking space in a car park									
Moving the car to another parking spot in the same area									
Reversing from a parking space onto a road									
Reversing from a drive-way									
Approaching your own drive way									
Leaving the kerb and moving into the traffic lane									
Driving on a short trip in quiet residential streets									
Driving on a busier street with a 60 km/h speed limit									
Driving on an arterial road with an 80 km/h speed limit									
Driving on a freeway									
Driving on a rural highway									
Driving on a quiet rural back road									
In peak hour bumper-to-bumper traffic									
Driving on familiar roads									

Remember: **0%** ..... **50%** **100%**
Never wear a seat belt — half the time — Always wear a seat

People wear seatbelts for different reasons. We are interested in how strongly these reasons influence your seatbelt use. Think about getting into a car and wearing a seatbelt. For each reason, please show how strongly it affects your behaviour by using a number between 0 and 10. A 10 means that it has a strong effect on you, and a 0 means it has no effect at all. The higher the number, the bigger its effect on your seatbelt use. There are no right or wrong answers.

POSSIBLE REASONS FOR WEARING A SEAT BELT		**POSSIBLE REASONS FOR NOT WEARING A SEAT BELT**	
Reason	Rating	Reason	Rating
I don't think about it, I just wear it		I need to be able to reach my child/children while driving	
Everyone I know wears seat belts		Seat belt fines are very cheap	
It makes me feel safe if I wear a seat belt		Seat belts can be dangerous, for example if I crash into water	
I might crash and the seat belt will protect me		I feel trapped when wearing a seat belt	
It feels strange without a seat belt		I drive cautiously so I do not need a seat belt	
Putting it on is automatic		It's easy to forget to put the seat belt on	
I might be caught not wearing a seat belt		Having a crash is so unlikely that I do not need to wear it	
Wearing a seat belt is a habit for me		I have an airbag, so the seat belt is unnecessary	
Even if I am really careful I might still be involved in a crash		I drive slowly, so any crash I have will only be a minor one	
The Police look out for people who do not wear a seat belt		I do not want my clothes to be creased or soiled by a seat belt	
I just put it on without thinking about it at all		The government shouldn't tell me what to do about seat belts	
My car is not very safe, so the seat belt helps protect me		It is hard to reach things in the car	
I like to drive fast, so a seat belt is a good idea		I am physically uncomfortable wearing a seat belt	
I have had a crash and it still influences me to wear a seat belt		I have back pain or neck pain that makes it painful to put it on	
I want to set a good example for my own family		It's better to be thrown clear during a crash than to be trapped	
I could not afford the fine		Whether I hurt myself is my own choice	
My children tell me to wear my seat belt		I never got into the habit of wearing a seat belt	
If I am involved in a crash I would be better off wearing a seat belt		I have not had an accident for so long that I do not think I really need to wear a seat belt	
Most other people wear them		Other people in the car expect me not to wear a seat belt	
Other people in the car expect me to wear a seat belt		It is only a short trip	
I feel anxious if I do not wear a seatbelt		The chance of getting caught is very small	
Other …….. ……		Other …….. ……	

Remember: **0** .....**5**.....**10**
No effect on me A moderate effect A very strong effect on me

These items ask about some of your general beliefs about driving, traffic and other laws, and technology. For each statement, please show how strongly you agree with it by using a number between 0 and 10. A 10 means that you agree with the statement very strongly, and a 0 means that you do not agree at all. Numbers between 0 and 10 mean that you agree somewhat, and the higher the number, the more strongly you agree.

Statement	Rating
I am comfortable using computers	
I am comfortable using a soldering iron	
I enjoy driving	
Traffic laws are often too strict	
I am a better driver than other drivers my age	
Children should always wear seat belts	
Seat belts are an important safety feature of cars	
I tend to eat healthily	
I believe I should always try to obey all laws	
I enjoy fixing my car	
I would like a car that doesn't let me drive too fast	
The Police should spend more time enforcing traffic laws	
I am comfortable using the internet	
It's too easy to get a driver licence	
I exercise regularly	
I would like a car that warns me if I am driving too fast	
People should never knowingly break the law	
I understand a lot about the mechanical aspects of cars	
I am a better driver than most other drivers	
Laws are an important part of society	
I am very safe as a driver	
People should wear a seat belt if one is available	
I would like a car that warns me if I am too close to other cars	

Remember: **0** .....**5**.....**10**
I do not agree — I agree somewhat — I agree very strongly

GE

Could you please complete the following items:

What is your marital status?	
How many children do you have under the age of 16 years?	
How many children do you have over the age of 16 years?	
What is your occupation?	
How many times (if ever) have you been caught speeding?	
How many times (if ever) have you been caught drink driving?	
Are you a smoker?	
If your next car had a technology that could detect whether people are wearing their seatbelts in the car and which would then give increasingly annoying sounds until people put their seatbelts on, how would you react (Answer by writing a number between 0 and 10, where 0 means you would not react this way at all, 10 means you would definitely react this way, and higher numbers mean you would be more likely to react in this way):	
… I would wear my seat belt more often	
… I would think about how to disconnect it or get around it	
… I would rely on it to remind me to use a seat belt	
… I would try to disconnect it or avoid it	
… I would feel embarrassed if the device is set off	
… It would not make any difference to whether I use a seat belt	
… I would end up forgetting to wear the seat belt in other cars	
… My friends would feel negative about it	
… My friends would encourage me to disconnect it or get around it	
… It would help me a lot	
… I would find the reminder annoying	
… I would be less concerned about my safety	
… I would be less concerned about being stopped by the Police	
… I would feel safer driving in busy traffic	
… I would feel safer driving a bit faster	

APPENDIX C: POST-SURVEY FOR DISCUSSION GROUPS

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE

P: D:

POST QUESTIONNAIRE

INVESTIGATION OF ATTITUDES TO SEAT BELTS

This questionnaire is designed to collect some final information after the discussion group.

The first set of items asks how strongly you agree with a series of statements. Could you please respond to each by using a number between 0 and 10. A means that you agree with the statement very strongly, and a 0 means that you do not agree at all. Numbers between 0 and 10 mean that you agree somewhat the higher the number, the more strongly you agree.

Statement		Rating
If I purchased a car with a seat belt reminder system, ……	… I would wear my seat belt more often	
	… I would think about how to disconnect it or get around it	
	… I would rely on it to remind me to use a seat belt	
	… I would try to disconnect it or avoid it	
	… I would feel embarrassed if the device is set off	
	… It would not make any difference to whether I use a seat belt	
	… I would end up forgetting to wear the seat belt in other cars	
	… My friends would feel negative about it	
	… My friends would encourage me to disconnect it or get around it	
	… It would help me a lot	
	… I would find the reminder annoying	
	… I would be less concerned about my safety	
	… I would be less concerned about being stopped by the Police	
	… I would feel safer driving in busy traffic	
	… I would feel safer driving a bit faster	

Remember: **0** ..... **5** **10**

I do not agree — I agree somewhat — I agree very strongly

Some of the concerns about seat belt reminder systems that have been expressed by other people are listed below. For each of them, could you please indicate how strongly you agree that this might be a problem with the introduction of seat belt reminder systems. Could you please respond to each by using a number between 0 and 10. A 10 means that you agree with the statement very strongly, and a 0 means that you do not agree at all. Numbers between 0 and 10 mean that you agree somewhat, and the higher the number, the more strongly you agree.

Concern	Rating
People will try to find ways to get around the system	
People will try and disconnect or break the system so it doesn't influence them	
People will be annoyed about having to do what the car tells them	
People will be annoyed with car manufacturers for developing the reminders	
People will be annoyed with road safety experts or the government for introducing them	
People will rely too strongly on the warning as a sign to wear a seat belt instead of remembering for themselves	
People will wear their seat belt to stop the warning instead of wearing it for personal safety	
People will drive less safely as they will feel more confident	
People will be more likely to forget their seat belt when driving in a different car	

Remember: **0** .....**5**.....**10**
I do not agree I agree somewhat I agree very strongly

The third set of items asks how strongly you agree with a series of statements. Could you please respond to each by using a number between 0 and 10. A 10 means that you agree with the statement very strongly, and a 0 means that you do not agree at all. Numbers between 0 and 10 mean that you agree somewhat, and the higher the number, the more strongly you agree.

Statement	Rating
When I first heard about the seat belt reminder systems in the discussion group I felt negative about them	
The group discussion encouraged me to try and disconnect or avoid the reminder system	
As the discussion went on, I felt more negative about the reminder system	
By the end of the discussion I was feeling positive about the seat belt reminder system	
I can imagine my friends talking about the seat belt reminder system as it becomes more common	
Discussions with my friends about the seat belt reminder system will be negative about the system	
I am now feeling that I would like to have a car with a seat belt reminder system	
I would choose not to buy a car if it came with a seat belt reminder system	
This discussion has been quite realistic for me	

Remember: **0** .....**5**.....**10**
I do not agree I agree somewhat I agree very strongly

Finally, we would appreciate **any** comments you might wish to make on different parts of today's session:

The first questionnaire:

The introductory presentation about the reminder system:

The group discussion (its relevance, flow, realism):

How did the Group Discussion change or influence your thinking?

Could you now summarise your thoughts about the seat belt reminder system, how you think it will effect you, and how you think you will respond when it comes out:

THANK YOU VERY MUCH FOR YOUR TIME AND ASSISTANCE

APPENDIX D: SUMMARIES OF GROUP DISCUSSIONS

The tables presented here summarise the content of the group discussions. It was not intended to provide a verbatim description of the discussions, but rather to summarise the main points discussed by the groups. The first author reviewed videotapes from each discussion and prepared the summaries below. Each table is headed with the date of the session, the number of participants, and the length of the discussion component of the group discussion.

14 March 00 – 6 Participants – Disc 33 min

PROMPT	COMMENTS
Questions?	• What if music is loud in the car? • Why not use a voice to remind the person – loudly – rather than a noise? • Why not keep tone going when slowing down? Couldn't they keep driving very slowly?
Feel positive or negative about the device?	• If forgetful it would be good • Good for people who are not concentrating • One S wanted an interlock – the car shouldn't start unless the belt is on • Everyone was positive about it • Concern about the price – worries that more expensive cars will have the technology and that people who most need it will not have access to it • Concern about possible disadvantages related to the technology – are there potential problems with the computer-control… this person was very concerned about technology • It won't affect people who carry a child in the car
Did anyone think about getting around it?	• A few did think about it • Friends might think about it
Reliability a concern? (raised in context of computer concerns)	• Suggested potential shut-down or incorrect warnings or no warnings • Concerns about technology
Are there ways to defeat the system	• Could sit on the seatbelt after doing it up • Listen to loud music through earphones (say using a walkman or similar) and drown out the warning • Turn the radio off if the system plays through the system • Insert some sort of circuit breaker or switch • Remove the fuse that is devoted to the system • Spare tongues and place them in the buckle • Why would you take the trouble to do all these things, why not just use the seatbelt? • Could you use a computer hacker or someone who knows the system • If you are that concerned about it, don't buy the car

Am I hearing that it's not worth the trouble to defeat the system?	• Yes • Just put up with it • Just wear a seatbelt
How would your friends react?	• One person has a strong non-wearer who refuses to wear a seatbelt in spite of fines – she wants her freedom • Could use it to influence non-wearing passengers – the noise is too strong • Strong non-wearers could always use the disabling mechanism • They'd grumble and complain, bit like when seatbelts were introduced, but they would go along with it
Do any of you have friends who would work hard at trying to beat the system?	• One person said yes – some who are into hot rods and cars would try to defeat the system – if someone told them they'd have to, if there was a system, they would try to defeat it just to beat the car
How will it feel having the car tell you how to behave?	• Cars beep if you leave the lights on – that's ok • Commodores had those speed warning devices and they were ok • It'd be awful having a lot of devices in the car telling you where to go and what to do
Is the added warning light making things too complex?	• Everyone thought it was ok • Once your seatbelt is on…. there is no extra light anyway
What are the critical issues that the manufacturers should think about and get right?	• The balance between being a persistent reminder and a distractor that will interfere with concentration when it suddenly comes on. The driver should be able to concentrate while putting belt on etc. • Think about making the warning earlier than 15/30… km/h, say a shorter time interval rather than speed • Reliability – it has to work all the time for a long time
What if there is just one small failure every now and then.?	• It has to be 100% reliable – you don't want errors • People rely on technology and it shouldn't let them down • One person expressed concern about seatbelts undoing if system failed • Seat won't be electrified will it?

15 March 00 – 6 Participants – Disc 35 min

Initial Reactions	• Beep wouldn't do much if loud stereo playing • Are the lights loud enough to be noticed on the instrument panel • Couldn't you just fasten the seatbelt before sitting in the seat? • Will the car be much more expensive with the new device? • Will it be mandatory in all new cars? • I keep the middle rear seat lap belt fastened at all times because it looks neater – will this be a problem, will it set off the device? • What about children – with children moving around in the car sitting in different seats and with child seats that use the seatbelt? • Are they talking about making it possible to install the device in older cars, like a car alarm? • Could they give insurance incentives to encourage fitting to older cars? • Are they only talking about passenger vehicles at this stage? • If the device breaks or fails, will there be enough people trained to

	fix it? • What about non-western countries and their problems with safety. Will devices like this end up in low-end cars? • Do you need a continual reminder – if people haven't put on their seatbelts by the third warning, then maybe that's just bad luck for them. • What about the social issues – what if a passenger just refuses to wear their seatbelt – or a couple in the back seat. How do you handle these problems apart from telling people to get out and walk.
So positive or negative?	• It'd be good to know when passengers are not wearing their seatbelts. • Current warning lights that come on for a short period are not very effective – they are a reminder but they can be ignored. • When you have something annoying you, you will want to shut it up. • It doesn't work in reverse!
Did you catch yourself thinking about beating the system	• No • I thought it was positive • I was thinking about exceptions – I know someone who never wears a seatbelt because of comfort problems – I don't know how he will react to this – probably try to avoid cars with the device. He may even put up with the noise.
How would friends react	• It's rare to find people who don't wear their seatbelts – it's part of the culture • Some friends might try to beat it • People are in a habit of using seatbelts • Don't wear a seatbelt in a taxi very often – device would be good there • It really should be made mandatory to make sure all cars have the devices as soon as possible • One friend thinks airbags are a substitute for seatbelts so doesn't wear a seatbelt where there is one. He doesn't take any notice of the written warnings about seatbelt use
How will it feel having the car tell you how to behave?	• Because most drivers use a seatbelt it won't make any difference • If it saves lives it doesn't matter
I want to defeat the system – what can I do?	• With the button to disconnect the system, could you just tape the button down permanently • Get an auto-electrician to rewire the button so there is a button in the vehicle on the dashboard • Velcro the seatbelt and use an extra "tongue" in the buckle • Get some earplugs • Cover the flashing light and find a physical way to muffle the sound • If it is attached to the sound system, buy a new sound system • Wouldn't a working device be a part of the road-worthy check, so you couldn't tamper with it? • If it's hooked into the engine computer system it would be difficult to disconnect anyway.
How will this device in one car affect you	• It will have to shock you to have a general effect in other cars • Because it's a habit, it's only in specific situations that people

in another car?	take off their seatbelts. This won't be affected as much.
So are you going to be happy with it or not?	• This won't make a difference to me • I'd rather a car without the device if I had a choice – I'm pretty safe anyway • I'd rather one with it • I don't really care whether it's in or out • It would help me to remember to put my belt on a bit earlier.
Any other comments of suggestions?	

18 March 2000 – 6 Participants – 36 mins

What do you want to know about the technology?	• So what turns the system off? What is to stop people cutting the webbing and leaving the tongue in the buckle or doing up the seatbelt and sitting on the seatbelt? • Why would people try to beat it anyway? • The beeping should be higher-pitched or more annoying • How loud is the beep – will it be loud enough to be heard over the radio • Has there been any research about putting seatbelts on while driving – is this a safety issue. • That beep was very annoying – it was driving me crazy on the video • Will it be mandatory, or will it be a choice • What about kids who want to annoy their parents? They could take their seatbelts off and the tone might be rewarding.
Was your general reaction positive or negative?	• Positive but it seemed as if it could be more advanced… but no idea how to make it more advanced • The lights could flash on and off too, or it could signal the Police • What about people who are deaf – it wouldn't work as well for them as for people with normal hearing
Did anyone feel really negative?	• None did • It's a good reminder – especially for older people • For the majority of people it is just a reminder. It is more an issue for those who don't want to wear their seatbelts. • It's no big deal because it is a reminder rather than an enforcer
Do any of you know people who don't like wearing a seatbelt	• I have a friend who has a child… sometimes as a passenger she undoes her belt to look after the child who is in the back seat
Did you think about what to do to get around the reminder	• Could just use the button to stop it – so why try and tamper with it if you really don't want to you can put up with having to push the button • Why tamper with it though… seatbelts are about safety and people don't understand how important seatbelts are • I have been in serious crashes twice and I still forget to put my seatbelt on sometimes. I can catch myself 100m down the road

	without a seatbelt on. This would be very useful for me. • It's easy to forget about the seatbelt until the first traffic light – this would help.
If I didn't want the device – what could I do to get around it	• You could smash it • You could disconnect the fuse • You could sit on the seatbelt • If you are that keen why not just push the button • Cut wire to speakers? • Disconnect the seat sensors or disable them a bit • I just really couldn't be bothered – the headlight warning light in my car drives me crazy and I now turn my lights off now to avoid the warning. I'd remember to put my belt on to avoid the awful noise • Could install aftermarket equipment that might interfere with the device – say sound systems or similar?
How will your friends react	• They all wear seatbelts
Will it feel off having the car tell you how to behave?	• Advanced technology is good – but where will it end? • This one is OK as it is a safety issue • It would be too stressful having the car do too many things for you – to have too many warnings
Can you envisage any problems?	• The noise would be very stressful • What if things go wrong - that would be very annoying if the car thinks you do not have your seatbelt on and you really do. • Will the sensors wear out • What about software problems in cars now – the intelligent part of the car sometimes misbehaves – will this be any different? • There would have to be a long-term extended warranty on the reminder system to lessen concerns about the device failing
How will having one of these systems affect your driving in a car without one?	• Might encourage people to use it as a habit • If you use the device as a reminder, you might be less likely to use a seatbelt in the other car without a reminder system • If it's a habit it shouldn't make any difference • The absence of a beep may itself be a reminder if you are used to being reminded to use your seatbelt
Are any of you tempted to beat the system?	• None were.

20 March 2000 – 6 Participants – 42 mins

Any questions?	• Could you put your seatbelt behind you? • Suggested a few attempts to beat the system based on having the belt pulled out or having the seatbelt buckled earlier • Volvos have this type of thing already don't they? • How loud was the alarm – what if your sound system is turned up very loudly? • Couldn't you just tape down the button? • Could you just rewire the switch so it is near the driver? • Is there a mechanism that limits the number of times you can press the button – that seems pointless – a small number of people will

	use it all the time. You could limit the number of times people use it • But most people who use this switch will do so for practical reasons. Most people don't just refuse to wear a seatbelt. • Why not have the switch in an even more difficult position • What about weight issues and children – will they be sensed by the car if they are light – this was thought to be a problem by most of the group • What about child restraint systems that use the seatbelt to keep them in place – this will throw out any system that detects the order in which people sit and fasten their belt – this led to a suggestion that the device be configurable by dealers to take into account different family/car use situations
General sense of positive or negative	• It would have to be very loud – people ignore their indicators all the time. • And people ignore their speed warning devices – it would have to be really annoying – like perhaps a voice? • Some speed warnings are really intrusive – like the BMW one that gets louder and louder. It would have to be like this • But if it is too annoying, more people might turn off the device on a trip-by-trip basis. It would be annoying and you would want to beat it for that reason. It shouldn't be too annoying. • It shouldn't have a turn-off button because people might use it too often. And people could always put a seatbelt on large parcels and pets anyway. • In general I like it but it should be louder • In general I dislike it – it would be too annoying • It's a good idea – but is it really necessary? Are there so many people not wearing seatbelts • Most of the group were generally positive
How will friends react to this device	• All my friends wear their seatbelts – they even remind me when I don't • Seatbelt use is now accepted • One person knows a non-wearer (based on principle) – he would not be happy with this device
Do you feel tempted to try and beat the technology?	• Yes – but not to stop wearing the seatbelt – just to try and beat it – because it's there
Can you suggest ideas for beating it	• Are there wires you could cut? • Modify the sound-generation system/speakers etc • With the step-by-step way it works, it seems hard to beat it • Perhaps a computer programmer could do it – but as a layman… it's really too hard. • Only compulsive people would really want to work that hard to beat the system • The group agreed that they were just going to accept the system if it was in their cars
Can you think of any problems – what might worry you?	• Reliability of computer systems – there are always teething problems • These types of problems would be a problem/annoyance • People generally thought that the benefits would outweigh any nuisance problems resulting from technology problems.

	• You wouldn't want it to go off while you were driving with a seatbelt on
How will it feel to have the car tell you how to behave	• Just another warning from the car • Most people won't even notice it though as they will have their belts on
How far could this system go – and how far should it go?	• Could have an immobiliser? – group didn't like this – not safe • Could use a speed limiter? • Flashing lights to attract attention were raised. These were viewed as OK • Don't think you should really go much further, though, as the more the nuisance-value of the system, the more likely it is that people will try to beat it
Will this device affect your seatbelt behaviour in other cars without the device	• Once you have a machine that reminds you – it will stop being a habit – I might wear my seatbelt less often as I will start to rely on the seat belt (note 35mins on --> vid this) – I'd wait for the machine to tell me to wear my seatbelt • Others felt the device would add to people's habitual use of belts • This was a good discussion with polarised views

21 March 2000 – 7 Participants – 36 min

Any questions	• What about children and child restraints – where the child restraint is held in by the seatbelt and it's already buckled • What about children – if light weights do not set the device off, how will it detect young children who might undo their belts or when parents sometimes forget • Lots of people don't wear seatbelts in taxis (one taxi driver in the group) – older people often do not, and kids sometimes are let run around in the taxi by their parents. • One participant has a friend who does not wearing seatbelts and this often results in a power struggle in the car over the use of this person's seatbelt. Although this is the other person's responsibility, it does make you worry about how you would feel as the driver. • The warning sound is very annoying in the video • One participant found that the noise in the video gave her a headache • One participant indicated that she became very negative about seatbelts during her 4th pregnancy – no reason, but this feeling has continued • Why not make seatbelts themselves more comfortable for different sized people? This might be more effective than adding technology to the car because non-wearers are sometimes just uncomfortable. • What about reliability – the American's had problems – how will this technology – like the switches – last with repeated use over time?
Did you find yourself thinking about beating the	• One participant definitely, others a bit, the women not at all • Could you just fasten the seatbelt first and then sit on the seatbelt • Discussing this raised concerns about childseats again

technology	• Will all car companies introduce it at the same time. Some felt they would decide about car purchase depending on the device, that some would avoid it but that most would be happy with the device – because many people know they should use seatbelts but they forget • Some might be deterred – the die-hard non-users of seatbelts • One person was opposed to compulsory seatbelt laws, but very positive about seatbelts and he chooses to use them
So most of you are positive?	• All agreed
Do you know people who will be negative	• People who are afraid of gadgets and technology – like older people • People who choose to not wear or who prefer not to because they are uncomfortable – such as larger people (women especially) and older people who lack the mobility to reach the seatbelt. These people will probably wear them to get rid of the warning
Will the technology make a difference to you?	• If you wear them all the time then no • Could help you to check on passengers • Would help when I forget
Are there any extra problems you can think of – any concerns you have	• If it stopped working from age or use – if it wasn't reliable – experiences with small technological components of cars is often negative. As long as it doesn't stop working • If it did – there was general agreement that people would work hard to remove the device • It would be very bad marketing if the device had reliablity problems – people might start avoiding cars with these devices if there were reports of problems • What about deaf people – how will the alarm affect them? • How about luggage – especially on the backseat – will the device respond to these. • Technological problems would be annoying and potentially expensive to fix • What about if you rely on the device to tell you to put on the seatbelt? If it stops working you might forget your seatbelt, and if you move to another car, you may not remember to use it. • One participant doesn't wear seatbelts very often – he indicated that the device might cause a habit to develop that would also occur in other cars without the device • Even the absence of a beep might cause you to remember the seatbelt. • The non-wearer chooses not to wear because it is uncomfortable, but he does wear it on longer trips • The women in the group (3) discussed not wearing the seatbelts because of clothing concerns, or modifying how they wear the seatbelt
So how far can we go with the reminders?	• Why not have a voice? • The level in the video is enough to make it clear, so anything above that is for a person who has chosen not to wear the seatbelt. If it is a reminder, then more annoying reminders are unnecessary – the person has made a decision rather than just forgetting • There is no need to go too far • The annoyance is already there – the main thing is that it is a

	reminder – it shouldn't try and force people • There should be a survey done to work out what level will bug most people without making them upset with the device • Car manufacturers won't make a device that is too annoying as they would be concerned about their market • Unless you are going to something drastic like an immobiliser, which no-one liked, then the warning in the video is fine.

25 March 2000 – 6 Participants – 26 min

Questions about the technology?	• Don't they already have devices like this? • What about the cost – how will this affect people without a lot of money? • Why doesn't the noise start straight away – as soon as you start the car instead of when you are already a fair way down the road
What was your general response to the technology	• This is good for people who do not yet have a habit • It really shouldn't interfere with putting your seatbelt after starting the engine… it's good like this • I think its good as long as it doesn't cost too much • It wouldn't be good if the technology was unreliable – if it went off when it shouldn't
What if it wasn't always perfectly reliable	• It wouldn't be too much of a problem, as long as it could be fixed
Was anyone thinking of ways they could get around it?	• No • I love it • (General negative reaction to this question)
What about people you know?	• Couriers could be a problem – one person was a part-time delivery person – I didn't wear my belt because it slows you down with deliveries • Couriers may complain, but they should be wearing their seatbelts anyway
How about the public in general	• Should be positive • Seatbelt use should be a part of normal driving – it should be a habit from childhood – this device should help • This might help passengers make drivers wear their belts to stop the noise
How will people feel about cars telling them what to do	• Wouldn't bother me • I have a brother who hates being told what to do… he would be dead-set against it • It has to be done even if people don't like it • What about if people start to rely on this technology? Won't they start to rely too much on it and stop wearing their seatbelts in other cars? This might be a real problem. • No.. the technology will be a reminder and will help people to form a habit

	• Younger people accept technology better than older ones
Would you be tempted to try and beat it	• No – it's too important – it's got to do with seatbelts • No – too hard • I wouldn't know how to
How could you try and beat the system	• Could you turn the radio up? • You could just buy an older car if you really hated it • Could you insert something into the buckle to disengage it? •
General acceptance	• Yeah – at least 80% will be happy with it • General acceptance thought to be quite high
How far can we go with alarms and warnings	• How about the sound of a car crashing? • Anything else might be a distraction – anything more than the warning tone might make it difficult for people to drive AND put their seatbelts – even the tone might be a problem • People will avoid the tone and put their seatbelts on earlier • Could we make it impossible to start the car without putting your seatbelt on
Are there any other problems	• Could the sensors influence the way your seatbelts operate? Could you be stuck in the seat? • Can you adjust the beeping – what about for deaf people? Will they hear the beeps? • Couldn't they use a vibration warning in the seat? • Are they set up to detect children as they sometimes take off their seatbelts.

27 March 2000 – 6 Participants – 30min – Reminder system video unavailable in this session so the discussion was based on a verbal description of the system

General issues and questions?	• They would have to set the seatbelt to accommodate children • I think there is too much technology on one item • I think it's a bit rough that you have to get out of the car and lift the bonnet to turn off the device • Couldn't you just tape the button down, or have a cable running from your handbrake
What was your initial reaction?	• I thought this is too much – it's overkill – simplicity is the way to go when buying a car • Could you turn up your radio to cover the sound • What if there are more people in the car than there are weight sensors – that may be a problem • If the car computer fails, you might have all the alarms and things going off • Seatbelts need to be more comfortable – I have to adjust mine away from my neck
What could you do to get around the device?	• Could you sit on the seatbelt • Could you pull it out, clamp it, and then put it in behind you • It would be too much bother to get around it – would rather just put the belt on
Potential problems	• What about people who use a racing-harness seatbelt – how would the technology work with this type of device, would there be an

	option available to allow people to set the device • What about children and child restraints? • The instrument panel is becoming like a 747. There are going to be too many things to attend to • Older people don't know about computers – maybe there are too many warning systems

28 March 2000 – 6 Participants – 47min

Any Questions?	• So it works with the weight of the person? • Will it work with any weight – what about children – is this going to be a problem for the device • It really has to work with kids – often they can be jumping around in the back seat and parents don't seem to care • What about people who carry larger dogs around in their cars, how will the system work for these people – if you do it often, having to push that button all the time would be annoying • The same thing applies here for groceries in the back seat and couriers and for salespeople with things in the back • Couldn't you get around it by doing up you seatbelt first and then sitting on it - or what about kids who slip their arms out of the seatbelt and things like that
So what was your initial reaction	• I think it's very good • Yes – it would be great • I could live with that – no problems • It'd be great – It'd let me know that the kids have their seatbelts undone – this is excellent • The sound would have to a piercing sort of sound • But that is a fairly annoying noise • Yeah, but with all the noises in the car with kids and the radio up loud – the noise would have to be extra loud • If it's attached to the sound system in some way… couldn't you stop it working by replacing your sound system – I'd be quite pissed off if I wanted to change my sound system and it costs extra because of this technology • There wouldn't be any malfunctions would there – what if it went off when I had my seatbelt on – that'd be pretty annoying • This may happen – alarms and things often stuff up – surely this would happen sometimes, but I guess it would work most of the time • Perhaps they could train mechanics to repair them and have the technology in workshops • It's a bit like airbags and other technologies – there are often some problems early on but they improve and people do accept them • Couldn't you stop people driving at all if they don't buckle up… • That'd be pretty bad for mechanics moving cars around in the workshop etc – this would be a real problem • Couldn't you tape down the button? • Does it work when you are reversing?
Did you catch yourself trying to	• Yes – I did – just because it's there – not to avoid wearing seatbelts

think of ways of getting around the system?	• My reaction was just to use the seatbelt – why bother trying to get around it • There's no reason to
How will other people react to this technology	• It'll be like airbags – they were a bit of an issue early on, but people soon accepted them and want them now • They'll be good for parents – they'll help you keep an eye on the kids
How will it feel having the car tell you how to behave	• Well cars already do that with alarms and warnings and things
What would happen if you had it in your car but not in other cars	• People would get into a habit of using a seatbelt
Could you beat the system in any way	• If I was a courier I'd be pretty annoyed and want to beat the system – having to take my seatbelt off and put it on over and over • What if you just disconnected it completely and removed all the system from your car? • They might have to legislate to stop people tampering with the system • I don't understand why people would want to tamper with it – either you'd put your seatbelt on or, if you needed to, just put up with the noise for a short time
Could we use louder alarms or more-annoying consequences?	• The sound and the flashing light are pretty annoying already • Could they use a speed limiter with the reminder system • (Most in the group) This wouldn't be very acceptable to people • People might stop buying some cars if the system is too reliable • Is all this really necessary though – don't most people wear seatbelts any way, so what is the point
Other Technologies – introduced and asked for general reactions	• AN alcohol warning device would be excellent • A forward warning device would be good • But what if it causes a crash – it might cause people to use their brakes when that is not the best option to avoid a collision • What about an elderly person – they might panic with different warnings and cause a crash • Younger drivers too – they might rely on the device and not make the best decision • People might panic and not know what to do • Will collision warning devices know about the weather conditions? • You would need to be trained to use your own car • They could use voice warnings – all the noises might be confusing • These will be very distracting for us older drivers • The drinking one is a good idea, but the rest may be too complicated, too confusing •
What are the underlying concerns then	• Too complicated with all the warnings in the car • Driving is too complex for a computer to handle detecting hazards – people will rely on it too much and the technology cannot be as good as people are. Will it make people worse drivers?

29 March 2000 – 7 Participants – 43min

Any immediate reactions?	• A wonderful idea • Yes – very good • I couldn't stand that beep • I'd be putting my seatbelt on all the time
Any negative reactions?	• I can remember when we didn't wear seatbelts • It's a good idea when you have children in the back – could tell when they didn't have seatbelts on • I think it's wonderful • I would rather have the beeping happen straightaway – it should start sooner, as soon as you start the engine (some agreement with this) • Don't some cars have something like this now • You could drive quite a distance and still have a crash before the beeping starts • The delay is ok because it would give you time to get yourself organised as you get started • I think this is a fair balance between annoying people and changing them • What about baby seats – how would the system handle baby seats
How will friends react – especially ones that don't use seatbelts	• This would be great – it would force them to put their belts on • People opposed to seatbelts would find a way around it • One relative would put up with it – he's deaf • They might go to a technician
Did you find yourself thinking about beating the system	• No (general response) • Don't think you could • I know people who would, but not me • You could just tape the button down • Could solve this by the shape of the button (say flush with the surround), or could solve it technologically with delays and things • Could pull a fuse • No – couldn't do that – it would be linked to other things
Are you tempted to try and disconnect it	• No (general response) • It's there for a reason • If it went on and on even when I had my belt on I would want to disconnect it • If that happened you'd take an axe to it • If you don't want it – just don't buy that car • Couldn't you just cut the seatbelt and click the catch into the buckle. • No – you could run a current through the belt, or a sensor on the reel • Couldn't I just buckle it behind me? • Gee that would be going to a lot of trouble – general thought was that most people wouldn't be bothered
Will it influence the car you buy?	• It'll just be a general option on the car that you take with the car • One person would "love a car" with this technology – she is forgetful and lazy about the seatbelt
I have one and I want	• Find an autoelectrician

to beat it… what can I do to get around the system?	• Could you click it in permanently and sit on it every time • The seat could measure a persons weight which would help it work out how far the seatbelt should be pulled out • This seems to be an expensive car!
How much would you be willing to pay to have one of these in your car?	• What's a life worth? • This might be like ABS and airbags – it might only be available for wealthier people • I would pay – I'd pay reasonable money – 200-300AUD – I am lazy and this would help me a lot
What about problems?	• If it was annoying me because of a failure – I'd want to destroy it • If there was a glitch – I'd take an axe to it • If it failed I'd want to have it fixed • No – if you pay for something like this, it should work • What would it cost to have it fixed • Would there be enough qualified technicians…. it really has to be failsafe • Yes – they have to get it right • Childseats are a major problem – with seatbelts done up to hold the seatbelt in • Animals could be a problem • Putting parcels might be a problem too • What about rushing to a hospital, eg, with a pregnant woman? • What about people who have medical reasons for not wearing a seatbelt? You would have to push that button every time • What about all the warning lights – I already have a lot of them, another one might be confusing – this didn't worry many in the group • Couldn't you connect the seatbelts up to individual lights that are visible from outside the car
Is this strong enough to annoy people – could we go further?	• Anything more would be distracting – a safety problem – anything more would be hazardous • Why not force slower driving – use speed limiters • Response to speed limiter idea was generally accepted by the group, although almost all thought the beeping is enough
How will driving in one car with the device influence driving in another car without	• The device will educate you – it will create a habit and people will get used to it – general agreement • You might find that some people don't have much experience in the newer car and won't have the opportunity to be trained in this way
Other technologies	• What about making seatbelts safer? • General comfort with these devices at first • Some uncertainty as the conversation went on… • Some discomfort with a car that restricted you or did your thinking for you • If your car did everything for you, you wouldn't concentrate as well because you would expect the car to warn you about things • All technology has glitches – this would be a risk if the car was making decisions. • Have we become so stupid that we need all these things….

01 April 2000 – 6 Participants – 35mins

Any questions	• How loud is the beep? – It would want to be pretty loud
First reactions	• Positive • A good idea • The visual thing is not that great, but the tone is great • Others felt the light was a good reminder • Does it work off pressure on the seat? • Is it compulsory to wear a seatbelt in Sweden and other European countries • Is seatbelt wearing related to drink-driving? • Is it more or a problem for passengers?
Any thoughts of getting around it?	• No-one thought about it during the video
How would friends and others react?	• Some would find the reminder system a nuisance, especially in the back seat
How could you get around the system?	• Could you tape the button down? • Could you use a wire or something that allows you to push the button while in the car • Will people really do that, will they try and get around the system? • Could you stop the car working as a way to stop tampering? • Could use an autoelectrician to bypass the system • Could you disable the buzzer? • It seems stupid of anyone to try and stop it? • What is wrong with wearing seatbelts anyway? This will help to remind people • Could you just put an extra clip in the buckle to fool the system • You could have your seatbelt behind you and fastened •
Can you think of problems?	• What about dogs and boxes in the car? Will they cause a problem • And what about children – aren't some children lighter than dogs – so if the system doesn't detect a dog, it might miss a child – eg given of 18month. • Shouldn't it work when reversing… • No – that would be annoying • It wouldn't generally be annoying – people would just have to put their seatbelt on and it wouldn't be a problem • What about loud music – wouldn't that hide the beep • What about drunk people – they may be oblivious to the noise and might disregard it – they wouldn't put their seatbelts on • People might get an older car to avoid it
What about where you have two cars and only one of them has the system?	• It would make you more alert about seatbelts • One spoke of a similar situation with a less intelligent reminder system – she is now more likely to wear a seatbelt in any car as she has developed a habit • Yes – it would make you get used to putting your seatbelt on straightaway
What if it was	• That would be a problem

expensive?	• It would stop people buying that car
How much would you spend?	• Quite a bit • If it was as expensive as airbags, that would be too much • $100 might be OK • Perhaps it should be a standard item rather than an option to solve this problem
How far could they go?	• No comments
What about reliability	• With all this technology…. things go wrong easily • What happens if the computer fails • I'd be really mad if that noise went off and it shouldn't have • It would make people upset if there was any fault in the system • I'm not sure about having something in my seat – it would feel a bit strange – might it give off EMR – people might worry about that • If a few things happened, and it's often not easy to get things like this fixed… this would be very annoying • It would have to have a long warranty • "They'd better do their homework right in the first place" • You could easily be 100's of km away from a dealer here and that might be a problem – not like in some parts of Europe where you might be closer to help

03 April 2000 – 5 Participants – 44mins

Immediate reactions	• A good device • Excellent • Really good • There are some cars already with some sort of reminder – but not as good as that – it doesn't always work, though • A lot could happen before 15km/h • I don't like the button to stop the system working • Couldn't you just sit on your belt • ….. but why would you do that? that would be awkward!… and they could make the seatbelt measure how far out you pull it to make sure it's around you • I don't understand having a button to disconnect the system • I have friends who are deaf – they wouldn't hear the noise and the light would be easy to ignore • I thought it was excellent, but my immediate reaction was why not immobilize the car? Wouldn't that work better? • … no – I usually put my seatbelt on as I start moving – that would be a pain • I thought that the fasten seatbelt sign would be a good novelty – the one above the mirror – but it would quickly be ignored as its effect would wear off • What about children's seats in the car? This is an important safety issue – how would the device cope with children's seats that use the seatbelt as part of the system that holds the seat in place? • What about older cars – it will take a long time for the system to be in a lot of cars

	• We have a new car and it has had computer problems – won't this technology have the same sorts of problems if it relies on technology • I really don't think it's loud enough to be annoying • … general disagreement here • General response was positive
Cost – what would you be willing to pay?	• You shouldn't have to think about the price – it should just be a part of the car… but it shouldn't add anything perceptively to the cost of the car • If you use your seatbelt, why would you want to pay extra • It's a bit like good drivers having to pay for bad drivers • When things go wrong with it, will it cost much to have the system repaired – that would be a serious problem. Our computer problems have cost a lot in time and inconvenience even though it was under warranty
What else could they do to make it more annoying if you don't think it's annoying enough	• Could you have a continuous voice • There are only two ways – either visual or with a sound. The visual thing on the dashboard is probably too small and people probably won't notice it, and the sound has to be loud enough to be annoying – the sound in the video sounds pretty annoying but it might take a while to influence some stubborn drivers • Could they use a head-up display to get people's attention • The idea of a fasten seatbelt sign above the mirror isn't very helpful – most people wouldn't notice it
Is the sound enough of an annoyance?	• As long as it can be heard over the radio, then it's ok – people often play their radio etc really load • Could you use the car alarm at really high speeds as an extra warning or reminder – or the car's horn
Did anyone catch themselves thinking about ways to get around the system	• Well I thought about putting it on behind me – but why would I bother • I'm pretty forgetful about my seatbelt – this would be great for me • It depends on why people don't wear their belts – if they are stubborn they might want to get around it, but if they are just forgetful this will help
If I want to beat the system.. what can I do	• Press the button every time • Cut wires to the buzzer or system • Use a seatbelt buckle • Keep the button pressed down • Take out the fuse • Could you get an electrician to put in a by-pass switch that you could use in the car • Some young people might want to work out how to beat it, just to be able to say they could – not because they don't want to wear their seatbelts • Participants were generally not interested in defeating the system •
Can you think of any problems	• What about really large people or people who have a medical reason for not wearing a seatbelt – surely using the button all the time would be too inconvenient for them • What about wanting to put boxes or packages on the seat? • The technology is getting too complicated – new technology does malfunction

	• You'd only need a few bad reports and that would turn the public off very quickly – it would need to be failproof • It would have to be well marketed to stop people finding reasons to complain or try to get around the system • What about dogs in the back of the car – won't they set off the system?
What about the car telling you how to behave – is that going to be OK	• Yes of course – it's a safety issue • Cars already beep and buzz at you for all sorts of things
How will having one car with and one car without the reminder affect your seatbelt use?	• It'll help create a habit that should work in the other car without the system, so it should be a positive
What about the newer technologies in the ITS car? How do people react?	• It sounds like it will do everything except drive the car for you • This sounds just greate • It's too much • It's too much technology • No – it would be OK – it would help you when you don't concentrate on the speed limit and things like that – it would be a good thing • It's too much technology – things beeping all over the place – it could be too confusing • They should be introduced over a long period of time… too many new things too quickly would be hard to handle • All the different signals might be too hard for older people to cope with – too much information and they might panic • It really would have to be totally reliable – every component would have to be perfect Otherwise you'd be having your car off at repairers all the time • As a parent of a teenager – these things would be great • … yes – on kids cars they'd be great, just I'm not convinced about on my car! • The drink-driving and seatbelt ones are good, but the speed control and collision warning devices sound worrying

04 April 2000 – 5 Participants – 42mins

Immediate reactions?	• Surely adults should be intelligent enough to wear their seatbelt – why do we need an annoying sound to remind them? I shouldn't have to put up with that because someone else doesn't wear their belt • This would be very effective – it's an annoying tone and it would be a hassle having to push that button all the time • This might help with overseas visitors and may be more useful in other countries than it would be here because of different levels of seatbelt use • What if it fails – like if it starts beeping and you can't turn it off – if the system is reliable, it would be great. • Wouldn't it be good if it had something to do with the ignition –

	that might help parents force their kids to put their belts on • Kids might use it to annoy their parents • Could you have the sound coming from near to the seating position where a seatbelt is not being used – sort of a personal reminder for that person? others thought this was a good idea • It'd be good to keep track of your children in the back
So are people positive?	• Seems that way – especially if it doesn't affect people who wear their belts
Did you catch yourselves thinking about different ways of getting around the system when the video was on?	• No – you just have to wear your belt •
What about your friends?	• One knows people who don't wear them in the back seat. They are likely to put their seatbelts on and probably wouldn't complain about it – it's really just habit • Some don't like to wear it… they'd probably just wear them
What are some ways I could use to get around the system	• A false buckle in the car • Could you hold the button down permanently • You could sit on top of the seatbelt • Pull the seatbelt out behind you and buckle it there • You could click the passenger's seatbelt into your buckle • Has to be a lead somewhere you could cut • You could make a gadget with a cable that mechanically depressed the button from inside the car • Could you remove a fuse?
Potential problems you can think of?	• What if you are a long way from anywhere and it fails – shouldn't we have a manual override that shuts it all down • These things do foul up – how would that be prevented? • It would have to let you reverse without wearing a seatbelt – older people prefer to reverse without wearing a seatbelt • This might be a problem for people who like to do their own repairs or who get "backyard" mechanics to do their repairs. This is the problem with a lot of technology • What about child safety seats where the seatbelt is connected all the time • What about those times when you put your shopping on the back seat • What about dogs on the back seat – even if there are seat belts for dogs, they may not be compatible with the system • If they set a minimum weight, what about the problem that some children are very light – you would want the system to detect light children and perhaps not detect shopping • Could they have a system that allows the driver to over-ride the system from within the car, but just for passenger positions… that way you could turn off the technology for a seating position that has a parcel or something in it • It's a good idea, but it may not be necessary for most people who use their seatbelts
Everyone seems positive – what	• Seatbelts are very expensive… this system sounds like it might be very expensive too – that would make them unpopular

would you be willing to pay to have this system	• A couple of hundred dollars might be OK • Will it be an option – if it is… it might not be very popular because of the extra cost
Could they do more with the system to make it more annoying, or is this enough	• A specific warning – say a light – in front of each passenger maybe? • Could have the lights flashing • No – the beep is plenty – it really is annoying • The same as the light-warning beepers – they are pretty annoying in cars at the moment • Would it be loud enough to be heard over the top of the radio – although I suppose you could have the system turn the radio off as part of the warning
What if you have one car with the system and one without – how will that affect your seatbelt use	• It will be harder to keep track of the children in the second car • You might rely on the warnings a bit – especially with passengers – this could be a problem
Other technologies – Your initial reactions?	• Sounds very good • What if it's an emergency and you have to exceed the speed limit – can you still do that • Will the speed devices influence the power of the car because this is an important aspect of the car • What about the extra training people might need to handle all this extra information • Will it be much more expensive when things go wrong – and with such complicated technology won't things go wrong more often • The reaction might be wrong for the situation – people might panic without looking around them and dealing with a threat sensibly