Frequency and Severity of In-Vehicle Distractions –
A Self-Report Survey

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Abstract
This paper quantifies the prevalence and severity of distracting driver behaviours using an online questionnaire survey. The instrument collected anonymous self-report data on demographics, rated frequency and severity of distracting behaviours. Data was collected from 482 respondents during a two-month collection period. The three behaviours rated most distracting while driving were writing text messages, reading text messages, and using the telephone hand-held. The most frequently reported distracting behaviours that resulted in self-reported accidents (and near misses) were ‘interaction with child passengers’, route guidance destination entry, and use of an ‘… add-on media device’. These were followed by the three items ‘reading a text message’, ‘following advice from a route guidance system’, and ‘interaction with pets’ with respondents also reporting accidents when undertaking these activities. Respondents rated cellular telephone use to be the most distracting driver behaviour, yet many still do this when driving.

Introduction
Inappropriate distractions or inattention to the road have been suspected to be responsible for substantial proportions of the accidents on our roads by the research community for some time. Researchers have undertaken several reviews of the literature in recent years (Basacik & Stevens, 2008; Regan, Lee, & Young, 2008; Wallis, 2003; Young, Regan, & Hammer, 2003). Historically empirical work has been undertaken since the late sixties to develop our understanding of the role of our attentional mechanisms in the driving task (Senders, Kristofferson, Levision, Dietrich, & Ward, 1967). The development of additional traffic, information and control technologies in the vehicle prompted research in the eighties and nineties in the evaluation of such systems (Wierwille, 1993; Zwahlen, Adams, & DeBald, 1988). During this period market penetration of these devices was relatively low, but progressively rising. In the last twenty years, the widespread use of cellular telephones and affordable route guidance systems, has led to an enormous increase in the potential for ‘additional unnecessary’ distractions in the vehicle. The much-cited one hundred-car study (Dingus, Klauer, Neale, Petersen, Lee, Sudweeks, Perez, Hankey, Ramsey, Gupta, Bucher, Doerzaph, Jermeland, & Knipling, 2006) provided some naturalistic data on the prevalence of distraction-related accidents, and has inspired numerous other studies internationally. Findings suggest that some 78% of all vehicle crashes involve ‘driver inattention to the roadway’ (Neale, Dingus, Klauer, Sudweeks, & Goodman, 2005). However, such studies do not seek to identify which specific behaviours are rated most distracting by drivers, nor how these may be related to the individual driver’s characteristics. Further, such empirical approaches
do not lend themselves to gaining insight or introspection regarding potential
distractions, actual behaviours or potentially questionable or illegal activities.

Some surveys have considered respondent’s views regarding driver distractions
(Royal, 2002). The Highways agency in the UK, undertook a questionnaire survey as
part of a project investigating driver distractions, e.g., roadside advertising. Findings
primarily consider external to the vehicle distractions, and complex or changing
images were highlighted as the most distracting features by respondents. 96% of
respondents indicated that their visual attention had been distracted by advertising
when driving (Speirs, Winmill, & Kazi, 2008). This finding is comparable with
another study undertaken by the Privilege Insurance Company who report 83% of
drivers have been distracted by roadside advertising (Privilege Insurance, 2006). Such
distractions, may demand the attention of the driver because of their physical and
psychological characteristics. In contrast, for some distracting activities a conscious
decision must be made by the driver, before undertaking them, e.g., initiating a mobile
telephone call while driving.

An Australian survey reports the most common distracting activities (from the
previous journey) as ‘lack of concentration’ (72%), adjusting in-vehicle equipment
(69%), and other people, objects or events (68%). The authors state that from self-
reported data, for 5% of the respondents, one in five accidents were attributed to
driver distraction (McEvoy, Stevenson, & Woodward, 2006). Another study from the
RAC in Australia report a survey identifying the nine most dangerous driver-derived
distractions and the nine distracting behaviours most frequently undertaken (RAC
Motor Insurance, 2009). The top three behaviours were i) reading or sending text
messages, ii) attending to children, and iii) reading maps, for the most distracting
behaviours; and i) consuming food and drink, ii) handling CDs, and iii) adjusting car
controls, for most frequent behaviours undertaken respectively.

The findings reported in this paper, cover an investigation into distracting behaviours,
subjective ratings of distraction, and the self-reported accident involvement when
distracted, of drivers in the United Kingdom.

Method
An online questionnaire survey was developed. This instrument collected anonymous
self-report data regarding; demographic information, accident history, interest in
technology, frequency and rated severity of engagement in distracting behaviours.

Procedure
The survey was promoted on BBC Radio Scotland and in electronic media (Heriot-
Watt University, School of Life Sciences web site and in a staff electronic newsletter),
and on a professional driver’s internet forum ‘Trucknet.uk’. Respondents to the web
site hosting the survey were initially presented with an informed consent.
Subsequently, there were five sections to the survey, i) demographics (12 items), ii)
rating and engagement with distracting behaviours (16 items, with ‘I haven’t done this
while driving’ and a likert scale ‘1’ - not distracting to ‘5’ - very distracting) for each
item, iii) a frequency of distracting behaviours (16 items, with ‘I haven’t done this while driving’ and an ordinal scale, with ‘daily’, ‘weekly’, ‘monthly’, and ‘yearly’ options for each item); iv) associated accidents/near misses (16 items, ‘Yes, I’ve had an accident’, No, but I’ve had a near miss’, ‘No’, and ‘I don’t know’ for each item) plus a field for any additional comments and feedback. The Heriot-Watt University, School of Life Sciences Ethics Committee, had previously approved the study.

**Respondents**
Data was collected from 482 respondents during a two-month collection period, between March & April 2009. 67% of the respondents were male, average age was thirty-nine (SD = 12.6) and on average, respondents had nineteen years of driving experience (SD = 12.1). Average mileage was twelve thousand miles per year (n = 403, SD = 5.79). ‘Interest in technology’ was elicited via a five point likert scale (very disinterested, disinterested, neutral, interested, very interested, 1 – 5 respectively); the mean score for the scale was 3.95 (n = 478, SD = 1.02).

**Results**
Analysis indicates the three behaviours rated most distracting while driving were associated with cellular telephone use. These were writing text messages, reading text messages, and using the telephone hand-held. The percentage of respondents reporting undertaking these activities while driving was 41%, 62%, and 52% respectively. The three most frequently reported distracting behaviours that resulted in accidents (and near misses) were i) ‘interaction with child passengers’ 2.1% (7.5%), ii) both, route guidance destination entry with 2% (2.8%) and use of an ‘…add-on media device, e.g., an iPod’ with 2% (3.9%), and iii) the three items ‘reading a text message’, ‘following advice from a route guidance system’, and ‘interaction with pets’, all with 1.7% of respondents reporting an accident when undertaking these activities (with 6.5%, 3%, and 2.2% respectively for near misses).

Distraction Ratings
For behaviours undertaken when driving, ratings for distraction are presented in Figure 1. The three activities rated to have the highest distraction were all cellular telephone-related, i.e., writing text messages, reading text messages, and using the telephone hand-held. The percentage of respondents reporting undertaking these activities while driving was 41%, 62%, and 53% respectively.

In Table 1, the frequency of undertaking distracting behaviours is presented. The three most frequently undertaken activities, on a daily or weekly basis, were use of the in-car entertainment system (91%), interactions with adult passengers (81%) and drinking (not specifically alcohol, 51%).

Reported Penalty Points, Accidents, & Near Misses
82.9% of respondents reported no penalty points on their license (n = 479). For those with penalty points, 13.2% had three points, 0.4% four points, 2.9% six points, 0.2% seven points, and 0.4% nine points. For accident occurrence, 63.9% of contributors
Figure 1. Distraction ratings and percentage of drivers engaging in the behaviour

reported no accidents within the previous five years (n = 482), 25.5% one accident, 7.1% two accidents, 2.7% three, 0.6% four, and 0.2% (one participant) five or more accidents. Behaviours resulting in accidents and near misses are presented in Figure 2. Excluding, the various features identified as ‘Other behaviours’, the three behaviours resulting in most accidents (and near misses) were i) ‘interaction with child passengers’ 2.1% (7.5%), ii) both, route guidance destination entry with 2% (2.8%) and use of an ‘…add-on media device, e.g., an iPod’ with 2% (3.9%), and iii) the three items ‘reading a text message’, ‘following advice from a route guidance system’, and ‘interaction with pets’, all with 1.7% of respondents reporting an accident when undertaking the activity (with 6.5%, 3%, and 2.2% respectively for near misses). Considering near misses and accidents together (and excluding ‘other behaviours’), the three most distracting behaviours were; interaction with adults, interaction with children, and reading text messages while driving.

Discussion
The aim of the survey reported in this paper was to characterise the prevalence of, ratings for, and self-reported accident involvement with, driver distractions. The findings reported in this paper, make it clear that many, many people are engaging in distracting activities while driving. The driver’s application of self-control in moderating their engagement with distracting behaviours is not working. Some of the activities, e.g., navigation device destination entry or composing text messages have been shown empirically to be highly distracting when the vehicle is in motion.
Table 1. Reported frequency of engagement in distracting behaviours (n = 482)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Time Period</th>
<th>Drivers undertaking behaviour daily or weekly (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>Weekly</td>
</tr>
<tr>
<td>Using the in-car entertainment system</td>
<td>80.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Interaction with adult passengers</td>
<td>28.4</td>
<td>52.1</td>
</tr>
<tr>
<td>Drinking</td>
<td>23.4</td>
<td>27.8</td>
</tr>
<tr>
<td>Eating</td>
<td>18.5</td>
<td>27.4</td>
</tr>
<tr>
<td>Interaction with child passengers</td>
<td>14.5</td>
<td>19.7</td>
</tr>
<tr>
<td>Using a telephone hands-free</td>
<td>18.3</td>
<td>14.1</td>
</tr>
<tr>
<td>Reading a text message</td>
<td>8.5</td>
<td>16.4</td>
</tr>
<tr>
<td>Following advice from a route guidance system</td>
<td>11.4</td>
<td>13.7</td>
</tr>
<tr>
<td>Using an add-on media device, e.g., an iPod</td>
<td>13.1</td>
<td>10.6</td>
</tr>
<tr>
<td>Using a telephone hands-held</td>
<td>3.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Entering a new destination on a route guidance system</td>
<td>5.0</td>
<td>6.8</td>
</tr>
<tr>
<td>Writing a text message</td>
<td>6.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Other behaviours*</td>
<td>8.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Interaction with pets</td>
<td>3.5</td>
<td>6.4</td>
</tr>
<tr>
<td>Using car displays you are unfamiliar with</td>
<td>1.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Using car controls you are unfamiliar with</td>
<td>2.3</td>
<td>1.9</td>
</tr>
</tbody>
</table>

* including, in descending frequency: personal considerations (11), smoking (10), other in-car (6), advertising (5), road signs (5), road and traffic-related (5), make-up (4), map reading (4), and other (4).

Figure 2. Frequencies of accidents & near-misses

Considering the behaviours with higher than average distraction ratings, these were dominated by mobile telephone tasks. All three of the tasks rated most distracting would be considered to be prosecutable under the dangerous driving legislation in the
United Kingdom, i.e., reading or writing a text message, or using the telephone hand-held. However, 41% of drivers admitted writing texts, 62% to reading texts, and 53% to hands-held use of their telephone while the vehicle is in motion. At least, only two in five drivers reported being prepared to write a ‘text’ while driving. However, three in five drivers would read one. The results compare well with that published by the RAC (2009). It is possible, if rather unlikely, that some drivers do not realise these are hazardous and illegal activities, which are potentially punishable with up to five years imprisonment. More interestingly, from a system design perspective, is why people feel the temptation to undertake these tasks. What factors are responsible for the seductive attraction of interaction with our friends, families, and colleagues that outweigh our primary vehicle safety concerns? How can we support and protect drivers from these temptations? Perhaps, through management of the telephone’s interaction with the vehicle and user, e.g., diversion of calls and texts while the vehicle is in motion, such distractions may be minimised. Other activities that were rated as highly distracting included navigation device destination-entry, use of unfamiliar car controls, and interactions with child passengers. 36% of respondents reported undertaking ‘destination entry’ with the vehicle in transit. Even for this highly distracting task, one in three drivers reported undertaking it. ‘Use of unfamiliar car controls’, or ‘interactions with child passengers’, were not so highly rated for distraction, but were reported as being experienced by over 70% of respondents. Data available from the survey makes it difficult to diagnose the specific nature of which car controls respondents reported experiencing difficulties with. Further work is planned to consider this finding in more detail. The distracting influence of children in the vehicle, while probably no surprise to parents, has only emerged in the literature in a limited fashion (RAC Motor Insurance, 2009) to date as a potential hazard. The author is aware of no funded research seeking to mediate this user-derived highly distracting hazard.

Clear differences were found between the frequencies which drivers undertook the various candidate distraction tasks. Considering the tasks undertaken on a weekly or daily basis, many of these were rated as being low level distracters, therefore (presumably) drivers were more prepared to undertake these frequently. For example, use of the in-car entertainment system, eating or drinking. However, several of the more highly rated distractions were reported as being undertaken surprisingly often by respondents. One in four drivers reading text messages or using an add-on entertainment device in a typical week. One in ten drivers undertaking destination entry on their route guidance system in a typical week.

Three distracting behaviours reported as resulting in actual accidents more frequently than any others were: interactions with children, route guidance destination entry, and use of add-on media devices (2.1%, 2% and 2% respectively). These were followed by three distractions, reading a ‘text’, following route guidance, and interacting with pets, all with 1.7% of respondents reporting having an accident while engaging in these behaviours. When considering the near miss reporting too, one in ten drivers report an accident or near miss when interacting with children in during driving. While less actual accidents have been attributed to interactions with adults (1.5%), the
combined near miss and accident percentage was 12.9%. 23% of drivers reported having either had an accident or had a near miss, because of social interactions with other passengers. In terms of mediating activity, it seems clear that more attention needs to be paid to reducing the distraction-inducing components of our passenger interactions. For example, this may be achieved by training drivers to recognise and avoid potentially distracting scenarios, or provision of incentives for the passengers to mediate their own behaviours. Broader recommendations to contend with potential distractions are reviewed by Young, Regan, & Lee (2008). The distraction risk from interactions with add-on devices, including route guidance systems have been well reported, and are substantiated here in both the actual reported accidents and associated near miss data. Reported ‘texting’ accidents support the subjective ratings made regarding for the seriousness of the activities, as reported above. It is concerning that 3.2% of drivers report having an actual accident when either writing or reading a text. In the United Kingdom, with 36,726,463 registered drivers as of 16th March 2009, this would equates to over a million drivers (DVLA, 2009). Clearly, our accident statistics do not report this. Perhaps, the (technologically literate) respondents who had mean values of above average for interest in technology, are more likely to be involved in technology and distraction related accidents. The relatively large proportion of responses categorised as ‘Other behaviours’, was indicated by 10.3% of respondents and may represent a substantial but difficult to address range of minor and varied attentionally challenging activities, e.g., smoking or applying make up.

It must be recognised that survey data of this type will inherently be biased. It seems highly likely that respondents would have been conservative in their reporting of their behaviours. Further, it seems reasonable they may have had concerns regarding the confidentiality and potential scope for abuse of honest reports. No data was collected that could identify respondents as individuals for the survey, but inevitably it is assumed this may have influenced response rates and the quality of answers. For one item, ‘Using the telephone handheld’, it is recognised in hindsight this may be interpreted as either referring to either voice or text communication, although this was immediately followed by two questions directly referring to texting and therefore, it is hoped this ambiguity, would have had a minor effect on results. However, the frequency of the reporting of ‘socially undesirable’ and illegal activities, lends some support to substantially frank reporting of respondent’s views. Subsequent follow-up survey work will address the scope of external (to the vehicle) distractions, frequency of smoking, and may consider the introduction of honesty and social desirability scales, to control for these potential confounds.

**Conclusions**

This survey has built on existing survey work looking at driver distraction. It adds detail regarding the severity, frequency, and accident association of various common distracting activities. The survey undertook to investigate the implications of driving behaviours, personality, and demographic features to identify how much these factors are responsible for engagement with candidate distractions. Results suggest drivers are frequently, and repeatedly conducting highly distracting, and in many cases illegal
tasks while driving (in the United Kingdom). It is hoped this study i) provides some
benchmarks for actual levels of engagement in distractions by UK drivers, ii)
indicates the relative severity of these, in terms of accidents and near misses, and iii)
provides some insight into factors which may be exploited to reduce the likelihood of
undertaking potentially distracting activities.

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