PSYC305-08A Applied Cognition & Neuroscience

Laboratory Assignment #1

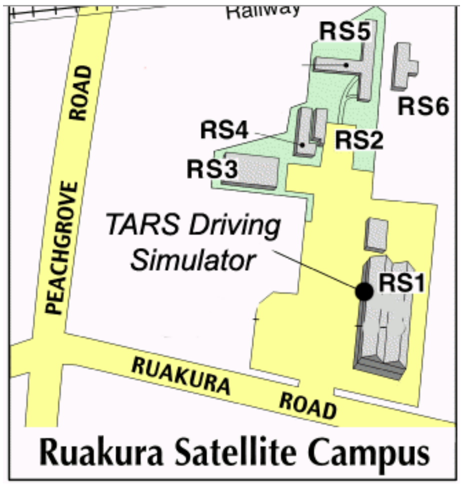
Instructions

For this laboratory assignment we will be conducting a class experiment in the area of road transport and driver behaviour. The finding that cell phone conversations impair drivers' reactions to road hazards has been well-established by researchers over the past 10 years. For example, in a 2002 study conducted in the UK by Direct Line Motor Insurance, 20 experienced drivers were tested on a simulator with the independent variables being normal driving, alcohol-impaired driving and driving while talking on a hands-free or hand-held mobile phone. The results of the study were that: the best driving performances (based on a number of measures) were obtained from those driving under normal conditions i.e. alcohol-free and not using a cell phone; driving under the influence of alcohol (at around a 0.08 BAC level) was significantly worse than normal driving but significantly better than driving when using either form of telephone; and using a hands-free phone was somewhat safer than using a hand-held phone but still remained a major cause of distraction (as shown in the figure below).

The first part of the laboratory assignment is to find three (3) recent journal articles on the subject of cell phone use and/or driver distraction. You should plan on using on-line data base searches to find these articles. Once you have located a copy of the articles (not just the abstracts) you will prepare a short summary of each article in an "annotated bibliography" format (maximum of 1 page per article reviewed). An example of the format for your summaries is shown at the end of these instructions.

For the second part of the laboratory assignment we will investigate a possible approach for reducing the harmful effects of cell phone conversations. It has been shown that drivers conversing on cell phones have longer reaction times and higher speeds as they approach traffic and road hazards. Drivers conversing with in-car passengers typically do not display these adverse effects on speed and reaction times. It has been hypothesised that one of the reasons for this difference is because in-car passengers will stop talking as the driver approaches a hazard (conversational suppression) and may also verbally direct the driver's attention to the hazard ahead. Cell phones are becoming an ingrained part of our social world and many people find it difficult to be out of cell phone contact while they drive. It has been estimated that 85% of drivers who own cell phones use them while they drive. Because it may be difficult to change these attitudes towards cell phone use through public education campaigns, we will conduct an experiment to see if cell phones can be used to provide warning messages to drivers about possible hazards on the road ahead of them. For example, if hazard warning signs were equipped with inexpensive RFID transmitters to broadcast warning tones (on cell phone frequencies) over short distances, would drivers conversing on cell phones take appropriate actions as they approach the hazards? We will test this idea using the TARS driving simulator which is equipped with a hands-free cell phone. The experimental hypothesis will be that "Hazard warning tomes broadcast on cell phone frequencies will overcome the negative effects of cell phone conversations on drivers' speeds and reaction times".

We will divide ourselves into two groups of participants; one group will drive a simulated 21 km road (containing 5 potential road hazards) while conversing on a hands-free cell phone and the second group will drive the same road while conversing on a hands-free cell phone that emits a series of warning tones as the driver gets within 300 m of a road hazard. The experiment will be run in self-assigned pairs of participants, one member of each pair will drive the simulated vehicle (who should be a licenced driver) and one member who will be designated the "conversor" and will be seated in a separate room carrying on a conversation with the driver over the cell phone. Once you have selected a partner for the experiment, you will sign up for a time to perform the test in the simulator on the sign up sheet (provided in class and available outside Dr Charlton's office door). Times available include Mondays, Wednesdays, Thursday afternoons, and Saturdays between now and 17 March (other times may be available by special arrangement). The simulator laboratory is located at the RS1 building at the Ruakura Satellite Campus near the intersection of Peachgrove and Ruakura Roads (see map at right).



The simulator will automatically record the driver's speed and reaction time throughout the drive and the conversation will be recorded by means of a video camera located in the back seat of the car. Each pair of participants will be provided with a data file and video recording from their session. An excel spreadsheet with spaces to enter your simulator data and containing an example of which data to use is available on Moodle (*305DataSummarySheet.xls*). Because we are also interested in the role conversational suppression (or the lack thereof) you will also examine the differences in the conversation between the two experimental groups. To do this you will replay the video from the sessions and transcribe (write down) what was said during the 30 seconds prior to each of the five road hazards. Each participant pair can borrow the video tapes and schedule a time to play them back on a large-screen TV monitor by contacting the Psychology Technician Rob Bakker (Room J1.14). You will enter a 30 sec transcription for each of the five hazard locations and count the number of utterances and words (for the driver and conversor). The excel spreadsheet contains an example transcription and word count. Once you have completed entering the data from your session, email your completed excel file to the instructor (Dr Charlton). The instructor will calculate group means and make them available to all participants for their individual laboratory reports.

Your laboratory report should contain: 1) a *Literature Review* section consisting of your 3 journal article summaries; 2) a *Participation* section briefly describing your role in the experiment and what happened (which group were you in, what was the driver's performance like, etc); and 3) a *Results* section comparing the performance of the two groups. The Results section should include a graph comparing the two groups' speeds and reaction times, and a written description of the results obtained and any conclusions you can draw from the data (was the hypothesis supported?; were the conversations different?; were crash rates affected?).

The laboratory report should be approximately 7-10 pages in length and is due in the FIC by 3 April. If you would prefer to submit an electronic copy of the report please make arrangements with the instructor (Dr Charlton) before the due date.

Example Annotated Bibliography format for your summaries

Van der Horst, R. and Hoekstra, W. (1994). Testing speed reduction designs for 80 kilometre per hour road with simulator. *Transportation Research Record*, *1464*, 63-68.

Description

This experiment tested several types of speed countermeasures designed to slow people down on 80km/h rural roads. The underlying principle to their approach to speed reduction was that speed would be reduced when the risk or discomfort caused by high speed was increased. The authors noted that perceptual speed adaptation, uncertainty, and task demand may also play significant roles in drivers' speed choice. It was hypothesised that negative consequences of speeding (risk, and discomfort) work best when they are consistent, real, and if the involved risk is detectable, verifiable and recognizable. These factors led to the four basic design elements of the countermeasures tested: lane width, edge marking, centre marking, and verge reminders.

Method

The speeding countermeasures were tested using a driving simulator. The countermeasures consisted of two lane widths (2.25 and 2.75m) and three experimental edge strips: a continuous profiled edge; a small lateral rumble strips every 5 meters; and rumble strips every 10m (total road width was constant at 6.20m). In an attempt to avoid providing "excessive visual guidance" the researchers provided tangible (tactile) rumble strips instead of visual edge line markings. On contact with the rumble strip both auditory and steering wheel feedback was produced in the simulator. Instead of the post mounted reflectors that are typically present on roads in the Netherlands, experimental "verge reminders" were placed at 500m intervals. Centre markings were increased from 0.10m to 0.30m with 3m long lines at 9m spacing. The participants (32 men) were instructed to drive "relaxed" or "under time pressure".

Results

The driving instructions had a significant impact on speed, with subjects under time pressure driving 15km/h faster on straight road sections (113 versus 98km/h) and 14km/h faster on curves (110 versus 96km/h). The narrow lane width (2.25m and .07m edge) reduced speed the most (especially under time pressure) and was relatively immune to adaptation. The different edge strips produced significant differences only for the narrow lane width. Combined with the narrow lane width, the continuous profiled edge line reduced speed more than the other two treatments.

Conclusions

The researchers concluded that the tactile edge treatments were promising speed countermeasures but needed to be combined with reduced lane widths in order increase the probability that drivers would come into contact with them. Reducing lane widths alone also appeared to have significant speed reducing benefits, even when drivers are motivated to drive at high speeds.