A way forward for the development of a South African driver-behaviour index

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ABSTRACT

Road safety is a core problem that governments battle with year after year. One of the areas in which South Africa has been lagging behind is the field of road and traffic psychology. This is despite the fact that some 90% of road accidents are considered to be due to human error. Still, little South African research has been performed to understand and consequently alleviate the problem. Approaches to addressing road-user behaviour on South African roads appear not to be correctly modelled to address the problem.

Research has indicated that driver-psychology research should be heading for an "intelligent, knowledge and rule-based model", which will explain driver behaviour within the context of a wide range of realistic and complex situations.

One way of addressing the need is to develop a driver-behaviour classification system that will enable researchers to better understand driver behaviour within the South African context. Internationally, road-user behaviour classification is not a new concept and both subjective and objective methodologies have been utilised to develop general road safety and individual road safety risk-behaviour indexes. A problem with this type of research is that it has become expensive, labour intensive and often impractical to use observers and interviewers to obtain information. To solve this problem, the collection of driver-behaviour information should be automated.

Internationally, an approach called naturalistic driving studies (NDS) has been employed to collect electronic data of volunteer drivers. NDS refers to the unobtrusive approach to study driver behaviour specifically. This methodology is new and will enable South African researchers to study driver behaviour in the context of the driving task and road environment, as well as inform driver actions preceding accidents or near-accident events.

ROAD SAFETY: PROBLEM STATEMENT

Road-traffic accidents are estimated to escalate from being the ninth leading contributor to the global burden of disease in 1990 to the third leading contributor in 2020.

Road-traffic injuries account for approximately 25% of all deaths resulting from preceding injuries. Based on death notifications of the Department of Home Affairs, it was estimated that in South Africa, transport accident-related deaths rose from 7,1% in 2002 to 10,8% in 2006. During this time, accidents contributed to a rise in the male death rate by 44,5% and the female death rate by 46,7%.

Decreases in the number of fatal accidents were recorded between September 2008 and September 2009 (RTMC, September 2009). While this is encouraging, particularly in the light of the South African government's commitment to halve the number of traffic accidents by 2014, there is still considerable room for improvement. Another road safety concern for South Africa is the increase in the number of registered vehicles, along with an increase in professional, learner and driver licences issued. An escalation in especially learner licences could point to an increasingly younger, inexperienced driver population in South Africa.

Road traffic accidents: a hard reality in South Africa

In addition to the increase in the issuing of driver licences, South Africa does not have a well-regulated driver-training industry; and concerns have been raised about the effectiveness of the K53 driving test. It seems that more and more unqualified and untrained drivers are entering the system, without the necessary experience, knowledge or the right attitude.

SCIENTIFIC DRIVER-BEHAVIOUR DATA

Accident data on road injuries and fatalities provide the most direct way to measure road safety. Access to credible and reliable data in South Africa is becoming increasingly difficult. Credible and reliable data are essential for the design and development of appropriate road-safety, law-enforcement and engineering countermeasures. The inability to successfully address the road-safety problem in South Africa is probably two-fold – firstly, not enough credible data are available to adequately inform the development of behavioural countermeasures, and secondly, there seems to be a general lack of understanding of what motivates South African road users to behave the way they do.

ROAD-USER BEHAVIOUR INDEX FOR SA

Road-user behaviour classification is by no means a new concept and both subjective and objective methodologies have been utilised to develop road-safety risk indexes. Conventional approaches to road-safety risk focus on specific data, known or presumed hazardous locations or particular at-risk behaviour such as driving too fast and overtaking dangerously.

Research that focuses on the identification of hazardous locations makes use of accident data to try to understand the behaviour that leads to an accident at a specific place and point in time.

Attempts aimed at summarising or automating the processes of understanding road-user behaviour (such as tacographs in heavy vehicles to monitor speed behaviour) are limited. The data are furthermore used either internally by companies to improve performance or for commercial purposes.

With the classification and indexing of 'normal' road-user behaviour, researchers may gain a better understanding of the motivation for road-user behaviour in any context and circumstances. A driver-behaviour index will need to take into account characteristics such as the engineering and enforcement environment from which the information originates, as well as the risk profiles and driver characteristics. This behavioural indexing will not necessarily be based on hazardous locations or revolve around expected actions at specific locations, but on the driver behaviour itself.

A driver-behaviour index as described here should incorporate all types of driver behaviour, and ensure that the information is captured, coded and analysed. The driver behaviour can then be classified according to the risk or type of behaviour, predicting or discarding specific actions to inform and contribute to the development of meaningful strategies, policies and procedures that will address the at-risk behaviour adequately. To develop such a behavioural index and classification system, data from many diverse environments will be needed; together with definitions to classify, describe and index the particular driver behaviour.

NDS METHODOLOGY

NDS methodology has been employed successfully internationally in Europe, Canada and the USA to collect driver-behaviour data. Real-time data in the form of image material of the driver as well as the vehicle and the environment are collected over a period of time. Because the driver 'gets used to' the camera and data-collection apparatus over a period of time, it has been found that drivers do not significantly alter their behaviour. NDS is considered an unobtrusive data-collection method. The data are collected automatically and stored in a secure location with access restricted to researchers responsible for the retrieval, coding and analysis there.

NYENDAWEB IN SUPPORT OF NDS

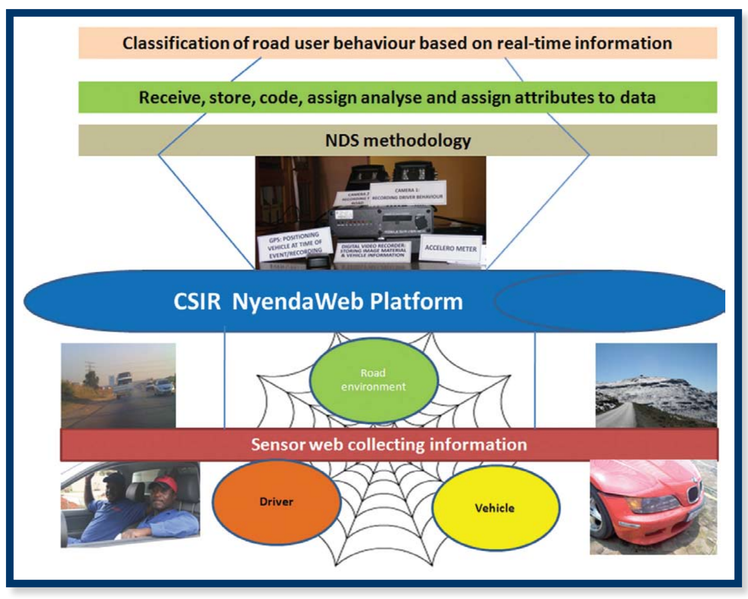
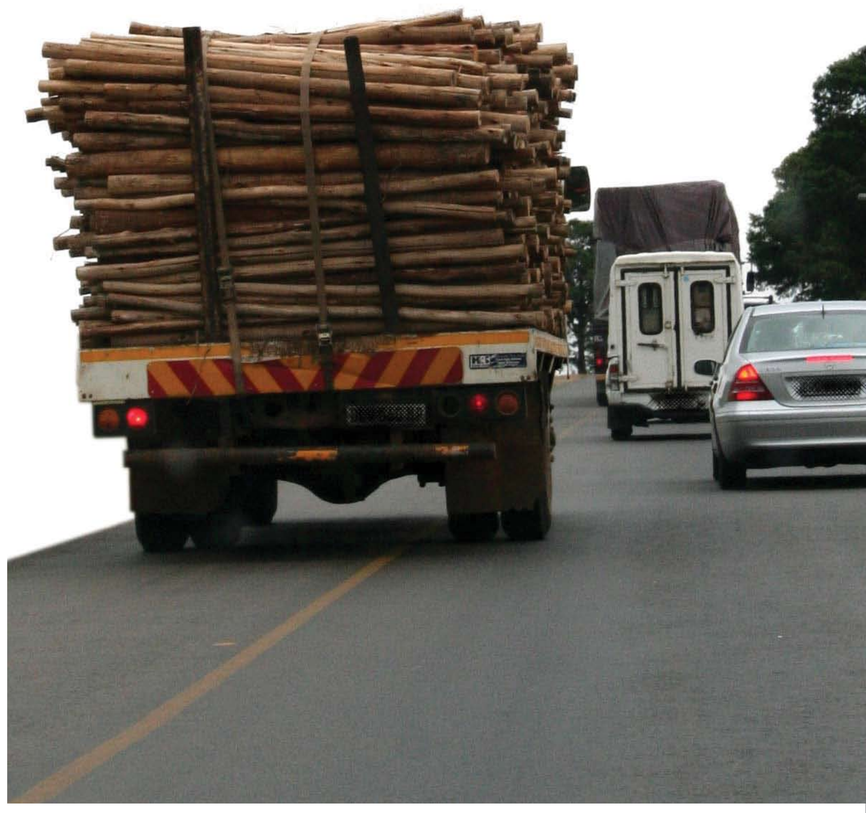


Figure 1: NyendaWeb's NDS Platform

With an increasing number of professional, learner and driver licences being issued in South Africa, the escalation in learner licences could point to a younger, inexperienced driver population.



The CSIR Nyenda programme is envisaged to integrate conventional transport and traffic data, unlock data sources currently not accessible and create new sources of data through the development and expansion of a sensor web. While the programme is still in its initial stages, its architecture has been developed. The envisaged sensor web will be able to record information of the road, the vehicle and the driver in different formats, at high rates, in large volumes and even in near real time', where appropriate and practical. The technology will also provide a platform for the development of an experimental driver-behaviour classification and index system.

The CSIR team is exploring its potential contribution to the NDS work that is being launched in the USA with participation from Canada and Europe. South Africa will possibly be able to contribute to this dynamic driver-behaviour database through specific data pertaining to driver behaviour within a developing country. This study will present the opportunity to collect enough data on drivers and possibly other road users to enable South African researchers to build capacity in terms of driver-behaviour studies. The NDS study is also seen as a possible source of information and collaboration to develop this driver-behaviour classification system.

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