

**Summary:**

# **Factors which affect driving speeds**

## **Literature studies and hypotheses**

### **SIP Driver behaviour models: Report 2**

A theoretical understanding of the factors which affect driver behaviour is an important condition in developing traffic safety measures. Within traffic safety research, the connection between the implementation of measures and the effects on the scope and extent of accidents is often evaluated on a purely statistical basis, i.e. without putting the results into a model which explains how the measures work. On the basis of this, a Strategic Institute Programme (SIP) was established at the Institute for Transport Economics to look at Driver Behaviour Models under the direction of the Norwegian Research Council, financed by the Ministry of Transport and Communications and the Directorate of Public Roads. The SIP focuses on drivers' choice of speed, precisely because speed is a key factor with regard to accidents and the consequences of accidents.

#### **Necessary to look at different influences in context**

The main purpose of the SIP is to increase understanding and provide better predictions of driver behaviour. By developing a unified model for driver behaviour, it will be possible to see the numerous different factors which affect driver behaviour in context. Through this, it will be possible to obtain a systematic basis for understanding why some safety measures work, while others do not. A unified model will also form a basis for proposing and evaluating new measures and thus ensure that the different conditions which can contribute to a reduction in the number of traffic accidents are taken into account.

Even though the SIP has a limited focus – drivers' choice of speed – the theme is nonetheless comprehensive. Understanding human behaviour and what affects this, and putting such insight into a unified model, requires that a number of different perspectives and approximations are tested. The SIP covers literature studies, theoretical arguments and empirical studies. This report presents results from previous studies as well as theoretically – based assumptions and hypotheses on what different conditions mean for drivers' choice of speed.

As the basis for clarifying confirmed associations between different traffic situations and driving speed, theories are discussed regarding what forms the basis for the experience of speed (speed perception), which signals (information) lead to that drivers increase or reduce their speed, and what connects the experience of speed with driver behaviour.

## **Speed limits, road design and vehicle characteristics are all significant**

Choice of speed is decided to a large extent by speed limits. The vast majority of car drivers maintain a speed which lies close to applicable speed limits, providing there are no obstacles which make a lower speed necessary. A number of studies show that an individual driver's driving speed is relatively stable.

The design of the road is of major significance for adherence to speed limits. It has been well documented that the width of the road, the curvature and sight conditions all affect the choice of speed. Broader roads, gentle curves and good sight conditions increase speed levels. It has also been documented that it is important to achieve consistent design and to use visual tools in order to achieve desirable speed objectively speaking. The road environment and the surroundings are of greatest significance in situations where the speed limit is not the primary limiting factor for drivers' speed, i.e. where the driver has greater freedom to choose his/her speed.

Vehicle characteristics will also be significant in the choice of speed. Since in many cases there is also a connection between driver behaviour and the type of car they drive, it is not always so simple to decide what the vehicle characteristics mean. However it appears that cars with good driving characteristics are consistently driven faster than poorer vehicles, but what exactly are "good driving characteristics" In the end it is the driver alone who decide the driving speed. One should rather seek the explanation in the kind of feeling of safety and security the vehicle "offers" the driver. Some characteristics are known, it is well documented that cars equipped with ABS brakes and studded tyres are driven faster than those which do not have this type of equipment.

## **Knowledge regarding conditions which are decided by situations and personal attitudes is insufficient**

Broadly speaking, a distinction can be drawn between more long-term characteristics amongst drivers, such as personality and lifestyle, and the conditions which are connected with the individual journey such as motives, the objective of driving and attitudes to given situations. The research in this area has focussed to a large extent on what the tendency to thrill- seeking means for driver behaviour and the results regarding speed violations and accidents.

On the basis of an overall evaluation of the comprehensive research literature in this area, there is reason to conclude that drivers with high test scores for thrill-seeking are characterised by high driving speeds, a great tendency to exceed the speed limit and other forms of risk related behaviour in traffic.

Many central themes connected with driver characteristics have not, however, been studied, but one such theme is discussed in this report, namely drivers' evaluation of the consequences of their choice of speed and feelings connected with this choice. We assume that the consequences of each individual speed alternative provide a number of feelings, positive and negative, which together are described as "sum of feelings". As a basis for their final choice of speed, drivers

must compare these sum of feelings, i.e. carry out a form of “emotional accounting”. Both personal characteristics and driving conditions will form part of this and moderate the sum of feelings provided by the speed alternatives.

## **Assumptions about choice of speed - the basis for evaluating the measures**

In the strategic institute programme on driver behaviour models, the main problem is limited to the question about the conditions which decide a driver’s choice of driving speed. Why are there such large variations in speed on a single stretch of road, and why does one driver use different speeds on the same stretch of road at different times?

In this report, a number of assumptions or hypotheses governing drivers’ experience of ideal speed and their choice of actual speed are formulated. A number of these assumptions correspond well with well-documented results or with basic theory surrounding driver behaviour, but are nonetheless included in order to obtain a full picture of choice of speed.

This means that the hypotheses put forward can in many ways be considered as a checklist to use in evaluating possible effects of new safety measures. This can be illustrated by some examples:

- We assume that younger drivers’ reference framework for ideal speed is higher than that of older drivers. It is therefore important to include elements in driver training which can make younger drivers aware of the relationship between ideal and actual speed and between ideal speed and risk.
- We assume that car drivers alter their driving speeds when they move from easy to difficult road and traffic conditions and vice versa, but that they do not compensate fully. On the basis of this, such transitions within the road system require supplementary measures which can give drivers extra incentives to adapt their speed to the actual level of risk.
- We assume that car drivers adapt their driving speed when they encounter a risk factor, but that the effect is short-term. It is therefore important to evaluate whether new measures can contribute to the effect becoming more long term.

## **Themes for further research**

In this report, we also indicate the need for further research, based on the hypothesis where the empirical basis is lacking. Some examples of themes which are suggested are how feelings connected with choice of speed develop and how they may be affected, the significance of having passengers in the car, how drivers adapt to other traffic and the significance of conditions connected with the journey itself, such as pressure of time and journey purpose. A central topic that is missing is the impact of personality and personality characteristics and how such impact may have on information processing and speed choice.

Some of these areas where knowledge is lacking are included in the empirical studies being carried out within the SIP. In a focus group study, Berge (2002) has looked more closely at different groups and their feelings connected with speed, and a planned simulator study will study choice of speed under different conditions. The distinction between consciousness and the unconscious is to a very little extent made explicit in traffic safety research. In a planned simulator study the SIP will consider more closely the role of the unconscious regarding drivers' choice of speed.

Furthermore we are working on a project financed by the Norwegian Directorate of Public Roads, looking at how different driver characteristics affect their choice of speed.

However, a number of the hypothesis which are discussed in this report will continue to represent challenges for traffic safety work and research in the years ahead.