

Effects of a new railway information system on train driver efficiency and subjective performance

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Abstract

The purpose of the present study was to investigate effects of providing accurate and dynamic in-vehicle information to train drivers by means of a kind of digital map on a PDA (personal digital assistant). It may be that enhancing the content of the task of the train driver by providing extra information affects efficiency, job satisfaction and subjective performance. It may also be that providing information distracts driver attention in such a way that it has negative effects on performance and acceptance, specifically with respect to safety. The objective of the underlying project was to determine whether the railway system would be safer and more efficient if train drivers are provided with an overview of the traffic situation in front of them by displaying accurate and dynamic context information.

To assess the effects of the new information system a group of professional train drivers was tested in a train driving simulator study on their objective and subjective responses to the provided information. The performance results indicate that provision of forward information on a PDA may potentially enhance the train drivers' awareness, improving decision making, and might lead to a decrease in energy consumption. The results from the questionnaires show that the train drivers indicate that decision-making, safety and personal satisfaction were enhanced with the use of the additional information given by the PDA.

Introduction

All sorts of traffic are rapidly increasing in volume and complexity, with concomitant increase in accident risk. Graham and Pollock's (1997) research on railway accidents shows that an alarming increase of "signals passed at danger" (SPADs) by train drivers (150 in 1995; 281 in 2003) has established, similar to red light running in road traffic. While SPAD cases rarely result in fatalities or injuries, they do create situations where the potential for increased risk is high. Missing relevant information in the operator environment is a well-known problem in a vigilance task when attention deteriorates (Brookhuis et al., 2004). In agreement with previous (rail) research, sustained attention is one of the most salient contributing