

# The effect of anticipation on mental workload while driving

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## Abstract

In-vehicle Information Systems (IVIS) and Entertainment systems are in common use today, and are often used by drivers whilst driving. Only a few drivers, for example, would interrupt their journey to search for a music track. All secondary tasks however, need additional mental resources. Following a classical workload approach, these resources are limited, and a higher workload should lead to a deterioration of the driving performance. However, accident rates have not risen excessively in the last few years (NHTSA). How do drivers therefore manage these demands? Adaptable driving methods are one feasible argument. To help explain these processes, a measurement of workload is needed, one that doesn't affect the driver and his dynamic behaviour. Different methods are described therefore. The "Index of Cognitive Activity" (ICA) is a physiological measurement that tracks the workload in a high resolution timescale. A short overview of a study is given, where the ICA is used. Possible behaviour adaptations are additionally analyzed to get a holistic picture of the compensative behaviour. Drivers seem to adapt their behaviour in order to reduce their workload if they can. By understanding these behavioural adaptations, it is possible to evaluate and develop future IVIS's to a more sophisticated level.

## Introduction

In modern vehicles, a broad range of different systems and functions can be used while driving. Route guiding systems, complex audio systems, multiple zone air conditioning or communication systems are often implemented in modern cars. As it has often been seen in everyday traffic and in different "real world"-studies, that drivers use all of these systems whilst driving (Dingus et al., 2006, Sacher, 2009). Even taking into account that some IVIS's are there to assist the driver while driving, from a cognitive view, the operating of such systems can be seen as a secondary task which nonetheless also requires mental resources. Every activity besides driving can be seen as a demanding additional task. Here, not just activities such as using the audio system or changing the driving route are meant, but also a conversation with a passenger, or listen to a fascinating radio report could be interpreted as a demanding task. With this in mind, it can be assumed that a drivers' mental workload is heightened every time he is performing another additional task