

# Effects of preactivated mental representations on driving performance

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## Abstract

This study investigated the distribution of visual attention and driving performance under different conditions of preactivated mental representations. It is propagated that a series of mental concepts is successively activated during driving. Once a concept is activated, reactions to similar objects are facilitated (priming effect). In order to examine to which extent activated concepts influence the behaviour while driving, a driving simulator-study was performed. The difference between the experimental conditions was the existence of a concept-triggering signal: In one version of the traffic scene a premonitory stimulus appeared as a static object (warning sign) and in a second version as a dynamic object (moving pedestrian) before a jaywalker emerged behind a parking bus. The control condition was characterised by the absence of a preactivating stimulus. The task involved a simulator drive while the drivers' eye movements were recorded via a SMI eye-tracker. The main results showed a difference between the trigger and priming conditions respectively in visual search and reaction time. Subjects responded faster (e.g. slowing down the car) if a corresponding traffic object had activated a concept before the emerging event occurred. These findings suggested that mental representations of high relevant aspects which were triggered by salient stimuli facilitate driving actions. Some implications of these results for road traffic design are discussed.

## Introduction

Particularly with regard to limited attention an important attribute of the human visual system is the capability to benefit from optical environmental impressions that facilitate a perceptual interpretation and thereby adequate motor reaction. The road traffic often includes corresponding sources of information which could be used to improve the visual information processing (Flowers, 1990). During their driving episodes subjects build up schemata and mental models of certain traffic situations. Aggregated over a longer driving history these aspects constitute the psychological part of the driving experience. In particular, schemata and mental models guide actions and generate a set of expectancies about how the system will behave (Wickens, Lee, Liu & Gordon Becker, 2004). In principle expectancies are the basis

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