

ACC effects on driving speed – a second look

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Abstract

Advanced cruise control (ACC) systems provide assistance to the driver by automating parts of the longitudinal driving task: operational control of speed and headway. In the past decade a series of studies with respect to effects of several ACC aspects were reported. In order to integrate different results of a few studies on the ACC effects on driving speed, a meta-analysis of seven simulator studies has been performed. Although in the meta-analysis the obtained average effect on speed was near zero ($ES_{um} = 0.0956$), further analysis showed that studies clearly clustered in two opposite groups: a group that demonstrated an ACC effect of increase in the mean speed ($ES_{um\ positive} = 2.5$) and a group that demonstrated an ACC effect of decrease in the mean speed ($ES_{um\ negative} = -2.3$). The predominant difference between these two groups of studies was in the type of the ACC system they used: ACCs that support drivers on a higher level (allocate more tasks to the system in comparison to other types of ACC) and/or that support drivers within a wider speed range, have the effect of an increase in the mean driving speed.

Introduction

Advanced cruise control systems provide assistance to the driver by automating parts of the longitudinal driving task: operational control of speed and headway (cf. Hoedemaeker, 1999). In the past decade a considerable number of studies with respect to effects of ACC aspects were reported (e.g. Hoedemaeker & Brookhuis, 1999, Hoedemaeker, 1999) It is expected that general implementation of ACC would lead to the choice of “correct” speed and safer headway as well as less variation in speed and headway. Thus, safety would be enhanced, however, sufficient evidence for this projection is still lacking. Different studies show different results about the effects of ACC on driving behaviour. Therefore, a general conclusion as to what extent ACC will improve driving behaviour and traffic safety is difficult.

An approach that would help to reduce the confusion as a result of these different insights is meta-analysis of the respective outcomes of these studies. Meta-analysis involves a (statistical) procedure that integrates the results of several independent

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