



Fatal intersection crashes in Norway: Patterns in contributing factors and data collection challenges

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ABSTRACT

Fatal motor vehicle intersection crashes occurring in Norway in the years 2005–2007 were analyzed to identify causation patterns among their underlying contributing factors, and also to assess if the data collection and documentation procedures used by the Norwegian in-depth investigation teams produces the information necessary to do causation pattern analysis. 28 fatal accidents were analyzed. Causation charts of contributing factors were first coded for each driver in each crash using the Driving Reliability and Error Analysis Method (DREAM). Next, the charts were aggregated based on a combination of conflict types and whether the driver was going straight or turning. Analysis results indicate that drivers who were performing a turning maneuver in these crashes faced perception difficulties and unexpected behavior from the primary conflict vehicle, while at the same time trying to negotiate a demanding traffic situation. Drivers who were going straight on the other hand had less perception difficulties but largely expect any turning drivers to yield, which led to either slow reaction or no reaction at all. In terms of common contributing factors, those often pointed to in literature as contributing to fatal crashes, e.g. high speed, drugs and/or alcohol and inadequate driver training, contributed in 12 of 28 accidents. This confirms their prevalence, but also shows that most drivers end up in these situations due to combinations of less auspicious contributing factors. In terms of data collection and documentation, there was an asymmetry in terms of reported obstructions to view due to signposts and vegetation. These were frequently reported as contributing for turning drivers, but rarely reported as contributing for their counterparts in the same crashes. This probably reflects an involuntary focus of the analyst on identifying contributing factors for the driver held legally liable, while less attention is paid to the driver judged not at fault. Since who to blame often is irrelevant from a countermeasure development point of view, this underlying investigator approach needs to be addressed to avoid future bias in crash investigation reports.

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1. Introduction

Active safety functions, or Advanced Driving Assistance Systems (ADAS), are receiving an increasingly prominent role in traffic safety. The goal of these functions is to prevent crashes from occurring and/or to reduce crash severity, by either alerting the driver to hazards or by taking over the driving task to some extent, e.g. by autonomous braking or steering in emergency situations. Examples of ADAS available on the market include Forward Collision Warning (FCW) and Lane Departure Warning (LDW).

To develop relevant ADAS, and to evaluate the extent to which they prevent and/or mitigate crashes, it is essential to be able to characterize the sequence of events which leads to crashes, in a way that includes information on the contributing factors that underlie

the crashes (Najm et al., 1995; Najm and Smith, 2002). One source from which to derive such pre-crash characterization information is in-depth crash investigation data, or *microscopic data* (OECD, 1988). According to Midtland et al. (1995) and Larsen (2004), such qualitative in-depth crash information is the best source available for identifying interactions between crash contributory factors, i.e. for defining crash causation mechanisms.

In terms of available in-depth crash data (at least in the Nordic countries) most of the available information comes from fatal crashes investigated by national road authorities. This is a natural consequence of the injury reducing strategy these authorities have employed, i.e. by focusing their investigation resources on the crashes with most severe outcomes and looking for ways in which to prevent those outcomes, the number of road deaths and severe injuries has successfully been reduced over the years. However, in terms of developing and evaluating ADAS and other countermeasures, a problem with fatal crashes is that one or more driver/occupant narratives always will be missing. Thus, while

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