Analysis of Driver Behavioral Adaptation to the Lateral Drift Warning System

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1) Introduction/Objectives

- Behavioral adaptation - changes in driving behavior over time as drivers adjust to presence of technologies
- Adaptation relies on human predisposition. Drivers perceive risk differently depending on personality.
- Assessing adaptation while using ITS safety devices - important role in determining benefit from device implementation

2) Data and Methodology

- Univ. of MI Transportation Research Institute (UMTRI) Roadway Departure Crash Warning – Field Operational Test
- Lateral drift warnings: visual, audible, tactile – vehicle exceeded thresholds of lateral distance from lane centerlines
- 71 drivers from Ann Arbor, MI, area - each participated for 4 weeks
- Week 1: pseudo-alerts – system recorded alert instances but did not warn driver
- UMTRI Technical Report (Ref. 1) shows changes in driving behavior over time – lateral vehicle positioning

- **Model Type** – Random Effects Negative Binomial (RENB), grouped by driver

3) Aggregate Analysis

- Alert freq. decreased with each passing week, offset by travel dist.
- Relationship between exposure and alert freq. - not linear
- Interactions: gender, smoker, yrs. with license
- Exposure significantly positively correlates with alert likelihood

4) Segmentation

**Driver Attributes**

- Gender - males had more consistent & noticeable decreases in alert frequency over time

**Predispositions**

- Higher risk perception levels - more substantial decreases
- Higher sensation-seeking desires - less substantial decreases
- Locus of control – no definable differences

5) Conclusions

- Drivers in study decreased alert frequency over time. Various characteristics can influence adaptation.
- Exposure significantly positively correlates with alert likelihood
- Small sample size - limits of reasonability for parameter significance and number of parameters evaluated
- Effects of some predictors may be influenced by technological skill levels (not measured) – biased estimates


Note: Research conducted from 2008 to 2009 during graduate program in Civil Engineering