"New, Improved, Comprehensive, and Automated Driver's License Test
and Vision Screening System"
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INTRODUCTION

Purpose

The objective of this study is ten-fold:

1) to evaluate recent literature on cutting-edge automated driver's license testing practices;
2) to collect and analyze the collision and fatality data for all drivers in Arizona and Florida;
3) to survey key driver's license bureau personnel in all 50 states and in other countries in order to assess the current automated driver's license testing system methodology;
4) to synthesize these data as bases for measurement criteria and risk analyses to evaluate the success of a pilot test;
5) to present a newly designed experimental visual screening system offering the most potential for a comprehensive and automated driver's license testing system demonstration project in the State of Arizona;
6) to demonstrate that a thorough measurement of the visual system is of fundamental importance to motorists everywhere
7) to promote highway safety through improved vision screening techniques of older drivers and at-risk visually impaired drivers.
8) to evaluate simulator sickness and aftereffects.
9) to offer simulator sickness mitigation strategies and suggestions for future studies.
10) to introduce the partial and/ or complete automation of other driver's license test components, such as cognition, knowledge (written), and/ or motor vehicle operation/driving skills. Such automation techniques may also benefit other transportation license tests.

Background

While the trends and risks of drivers in the States of Arizona and Florida are calculated and presented, this study shows that older drivers are most susceptible to at-fault automobile collisions when lighting, weather conditions, and select violations are investigated. These paradigms, combined with very high collision, injury, and fatality rates, prove that a completely new vision testing system is needed to screen at-risk drivers. Since we reviewed the driver's license policies, practices, and testing methodologies of the entire United States, Commonwealth of Puerto Rico, Canada, Australia, United Kingdom, and New Zealand, the results of our study not only apply to Arizona and Florida, but to every state, province, territory, nation, or country that seeks to improve safety on its roads and among its motorists. This is the very first study of its kind to identify a systematic approach to driver's license vision testing on the bases of comprehensively studying driver behavior in two U.S. states with a considerable number of older drivers, significant population growth over the last decade, and investigating numerous national and international commercial and research products and components.

Project Overview

Four components define our report: a literature review, a global survey of the directors and their representatives of driver's license bureaus, statistical studies and risk analyses of both Arizona and Florida drivers of all ages, an evaluation of vision screening tests and driving simulators, and the presentation of a newly designed comprehensive and automated vision testing system by ESRA.

The first section contains information gathered largely through on-line searches of books, journals, newspapers, and Internet Web sites. This study includes an extensive bibliography of relevant documentation after the Appendices. The second section describes the underlying process of the global survey of the directors and their representatives of driver's license Bureaus of all 51 U.S. states, Commonwealth of Puerto Rico, all ten provinces and three territories of Canada, six states and two territories of Australia, and all of New Zealand and the United Kingdom. The survey addressed vision testing policies and practices of these bureaus. Results are displayed in the forms of tables and figures. The surveys are included as Appendix B and Appendix V. The third section presents the analyses of collision data for all drivers provided by the Arizona Department of Transportation Traffic Records Section and the Florida Highway and Safety Motor Vehicle Department, for the 11-year period from 1991 to 2001. When possible, we illustrate our results in the Minimum Model Uniform Crash Criteria (MMUCC) standard format. Collision factors, such environmental conditions (lighting and weather), manner of collisions, and violation behavior are illustrated through the application of Relative Accident Involvement Ratios (RAIR) and probabilistic risk analyses of all age groups. We briefly summarize our results after each table and figure in Appendix C.

The fourth section introduces us to the power of Relative Accident Involvement Ratio (RAIR) and its usefulness in determining which drivers, on the bases of age, are most susceptible to at-fault collision involvement with respect to weather, lighting, and manner of collision. The fifth section provides us with an overview of the Arizona driver collision rates over an 11-year period. The sixth section highlights the Average Individual Risk calculations and its application to both Arizona and Florida drivers.

The seventh section covers some of the latest vision test equipment and driving simulators available. We review the histories of these products, highlight some of their strengths and weaknesses, and discuss ways that, as part of a system we design, they may improve safety and ultimately reduce collision risks among all drivers.

Our study supports the initiation of more comprehensive and stringent vision testing methods in order to adequately screen at-risk drivers.