

Human Factors in Transportation Accidents

Overview

Exponent is actively involved in the study and investigation of how humans contribute to accidents in transportation. Our scientists and engineers have authored numerous peer-reviewed publications on transportation accidents and safety and are available to conduct subject testing of components of products, analyze human behavior in accidents, and provide litigation support to clients. We assess human-factors issues related to accidents involving:

- » Motorcycles
- » Large trucks and buses
- » Trains
- » Bicyclists
- » Industrial equipment (e.g., forklifts, boom trucks)
- » Off-road vehicles
- » Emergency vehicles
- » Pedestrians



Vehicular accidents remain one of the leading causes of unintended deaths and injuries in the U.S. Traffic accidents are often influenced by three factors: the vehicle, the environment, and the operator. Our scientists address the role played by each of these factors in the analysis and prevention of traffic accidents.

Human factors scientists and engineers specialize in understanding how the design of a vehicle influences the effectiveness and accuracy of its operator. Some of these factors include a vehicle's controls and displays (e.g., automatic cruise control, power steering, navigation systems), restraint design (e.g., seat belts, airbags), and field of view (e.g., mirrors, windows, cameras). Our staff can assess the impact of environmental variables on driver operation of vehicles, including road layout, road surfaces, traffic signals, lighting, glare, and weather conditions.

The majority of vehicular accidents are attributed to human error. Consequently, a critical component of many accident analyses is the examination of the operator. Exponent's human factors scientists and engineers are able to assess the contribution both of intrinsic and extrinsic factors affecting driver behavior. These include:

- » Decision making
- » Demographics (age, gender)
- » Distraction
- » Drugs and alcohol
- » Driving experience

- » Driver training
- » Familiarity with vehicle and environment
- » Fatigue
- » Inattention
- » Response to the unexpected
- » Risk-taking behaviors
- » Stress, panic, and hypervigilance

Our breadth of capabilities and analysis tools ensures that our final product is both rigorous and defensible. We specialize in accident database analysis, surveys and observational data collection, image processing techniques for visibility and conspicuity analyses, and design and execution of experimental research with human subjects. Our vast experience and resources have allowed us to develop expertise in a variety of areas, including but not limited to:

- » Accident avoidance: braking and steering
- » Adaptive cruise control
- » Back-up accidents
- » Behavior at curves and intersections
- » Car-following behavior
- » Cell phone usage
- » Effectiveness of alarms and warning information
- » Gaze patterns and visual search
- » Gear shifting
- » Hand controls
- » In-vehicle device usage
- » Low-vision situations: nighttime, fog, rain, snow
- » Mirror usage
- » Park-to-reverse incidents
- » Pedal error
- » Reaction times
- » Seat belt usage
- » Speed and slope estimations
- » Unintended accelerations
- » Vehicle egress