Prof. Philip Koopman

Carnegie Mellon University

@PhilKoopman

Potential Autonomous Vehicle Safety Improvement: *Less Hype, More Data*

OESA Panel, November 7, 2018

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Misquoted: People Cause 94% of Crashes

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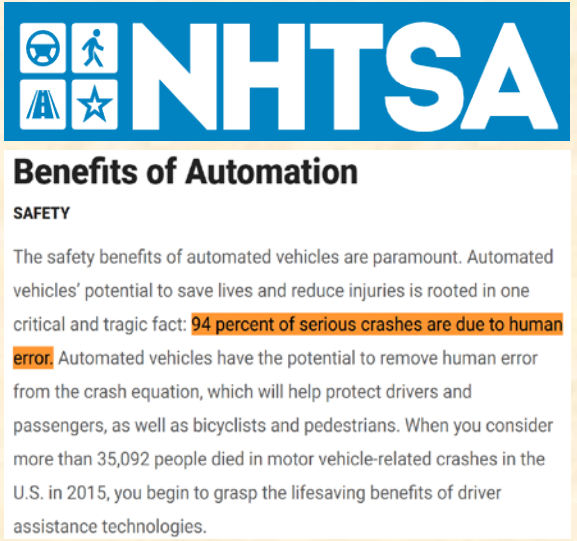
- **Where did "94%" come from?**
  - "The critical reason was assigned to drivers in an estimated 2,046,000 crashes that comprise 94 percent of the NMVCCS crashes at the national level.

    However, in none of these cases was the assignment intended to blame the driver for causing the crash."

    [DOT HS 812 115]



https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety

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Myth: It's All Cell Phone Distraction

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- **37461 Fatalities**
  - 63% Passenger vehicles
  - 14% Motorcycles
  - 19% Pedestrians, bikes, etc.
  - 3% Large trucks (total 99% due to rounding)

(2016 data DOT HS-812-456)

- **One fatality per 85 million miles, *including impaired drivers***
  - 28% Alcohol Impairment
  - 28% Seat belt not used in passenger vehicle
  - 27% Speeding
  - **9% Distracted driving**
  - … (total more than 100% due to overlap)

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Can We Improve Seat Belts & Impairment?

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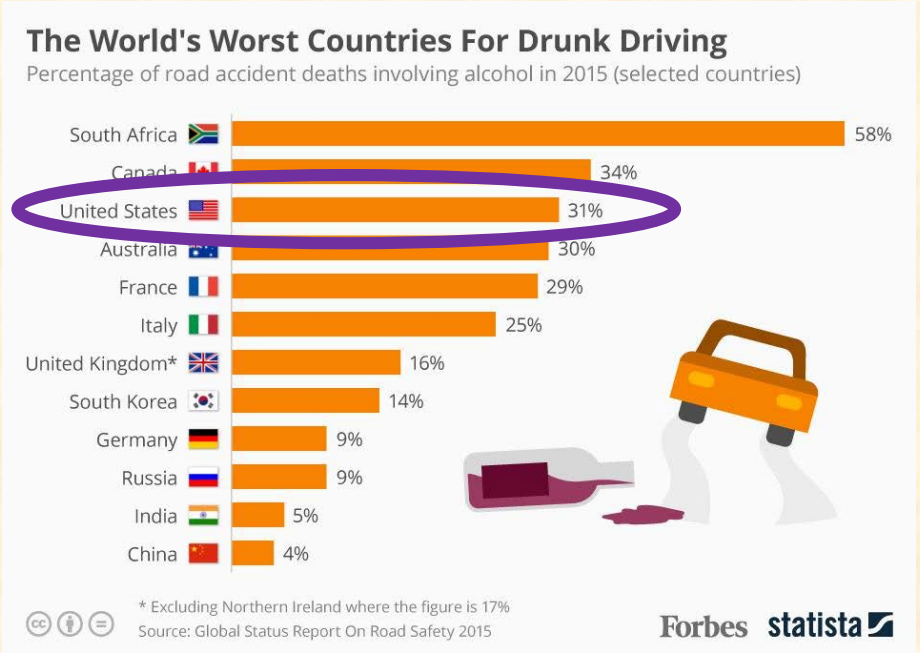
- **Seat belt use:**
  - Seat belts saved 14,668 lives (age 5+)
    - 100% seat belt use would save another 2,456 lives
  - Air bags saved 2,756 (age 13+)

- **Impaired Driving**
  - Marijuana effects are unclear



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More Realistic AV Safety Expectations

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- **AVs can probably cut fatalities in HALF** (2014 Casualty Actuarial Society)
  - **22%** reduction due to **operational limits**
    - Due to: weather, vehicle errors, inoperable traffic control devices
  - **30%** reduction due to **human behavior**
    - Not wearing **seat belts** (10% of population; 16% of 8-12 year olds)
    - Drive manually (in a hurry➔**speeding**) or "I drive better than an AV"
    - Drive as supervisor while **impaired** ("it drives itself") or **distracted**

https://www.casact.org/pubs/forum/14fforum/CAS%20AVTF_Restated_NMVCCS.pdf

- **AVs are likely to fail differently than people**
  - Social interactions with human drivers & pedestrians is a challenge
  - Autonomy perception is difficult
  - AVs have trouble knowing when they don't know

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AV vs. ADAS Market Penetration

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- **What if full autonomy only deploys in cities?**
  - About 50% of fatalities are in rural areas
    - About 19% overall rural and not on “arterial” roads
  - Perhaps **9,500** fatalities avoided for urban improvement of 50%

https://www.iihs.org/iihs/topics/t/roadway-and-environment/fatalityfacts/roadway-and-environment/2016

- **ADAS as a safety stepping stone**
  - Forward Collision Warning & Automatic Emergency Braking
  - Driver distraction/inattention monitoring
  - Need better understanding of semi-autonomy tradeoffs
    - Supervising semi-autonomy is difficult
    - Are low level ADAS improvements masking supervision problems?

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