

*TRB 97th Annual Meeting Session 361
"Managing the Safety of Older Commercial Drivers"*

Is There a Case for Performance (Functional) Testing of Older CMV Drivers?

Loren Staplin, PhD
TransAnalytics, LLC

- What enables safe driving?
 - > knowledge (rules of the road, vehicle capabilities/limitations, etc.)
 - > skills (operational-, tactical-, and strategic-level driving tasks)
 - > ability (requisite levels of visual, cognitive, and physical functioning)

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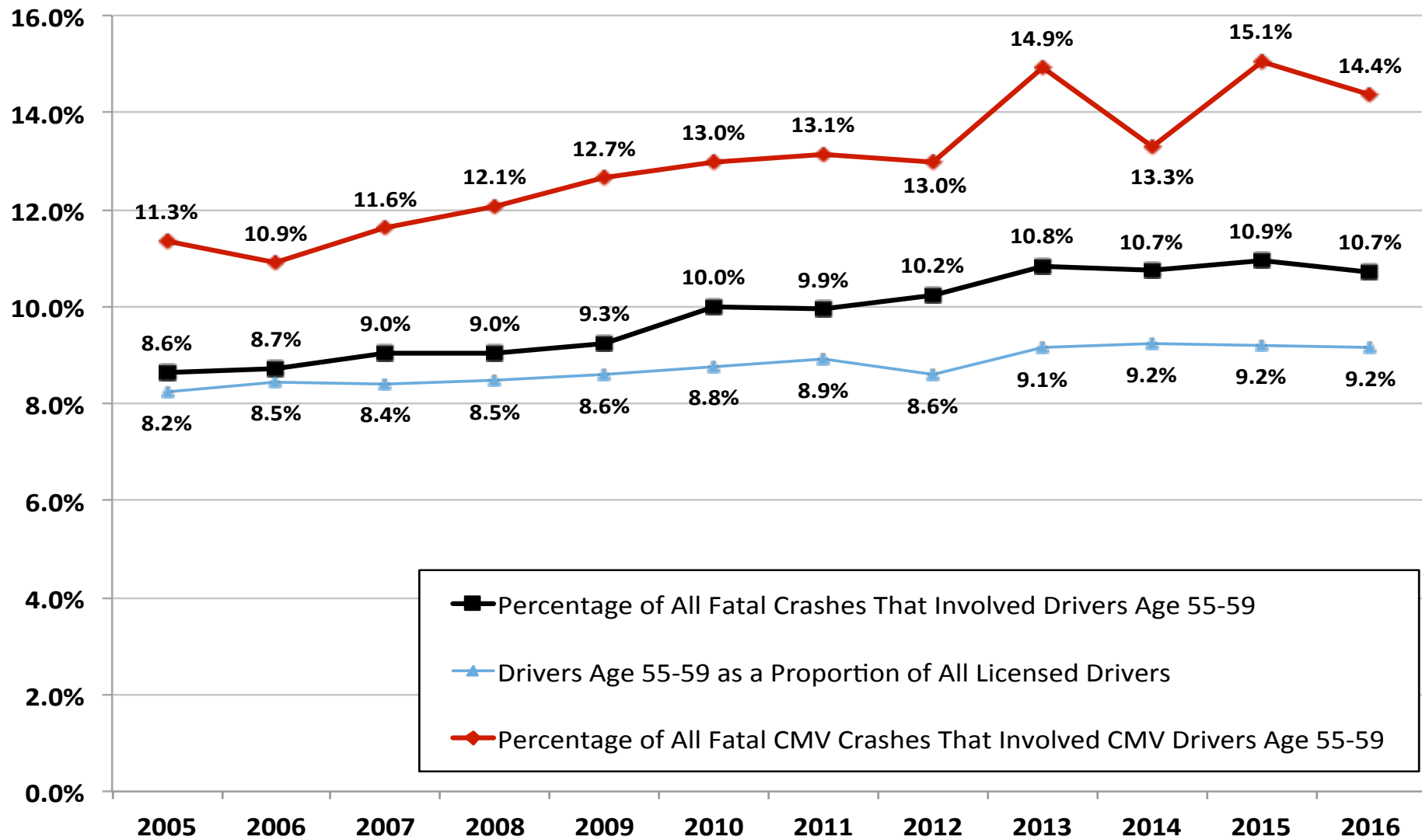
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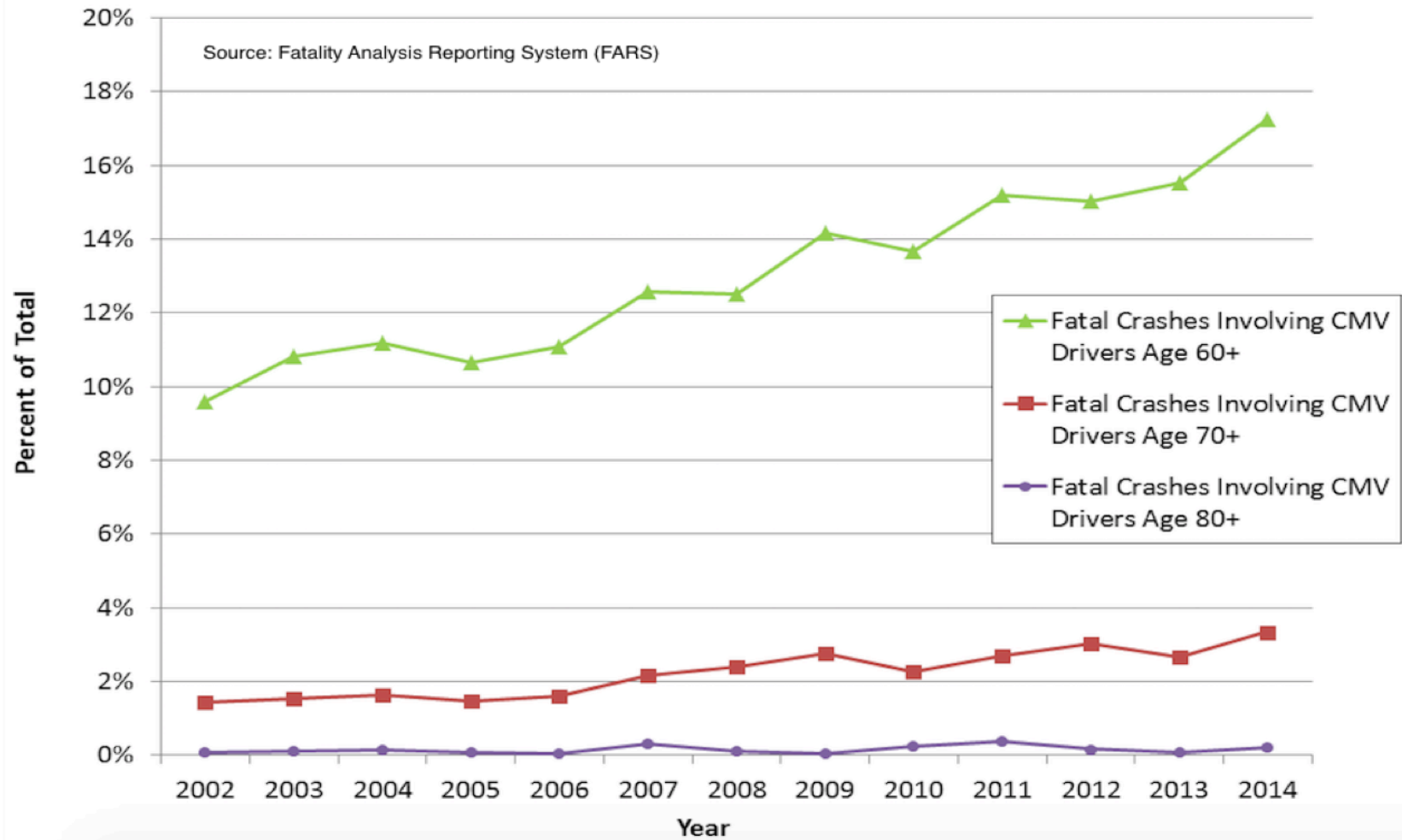
To the extent crash involvement for CMV drivers increases with increasing age, it raises a concern about (age-related) declines in functional ability.

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Fatal Crashes Involving a CMV (Large Truck Or Bus)



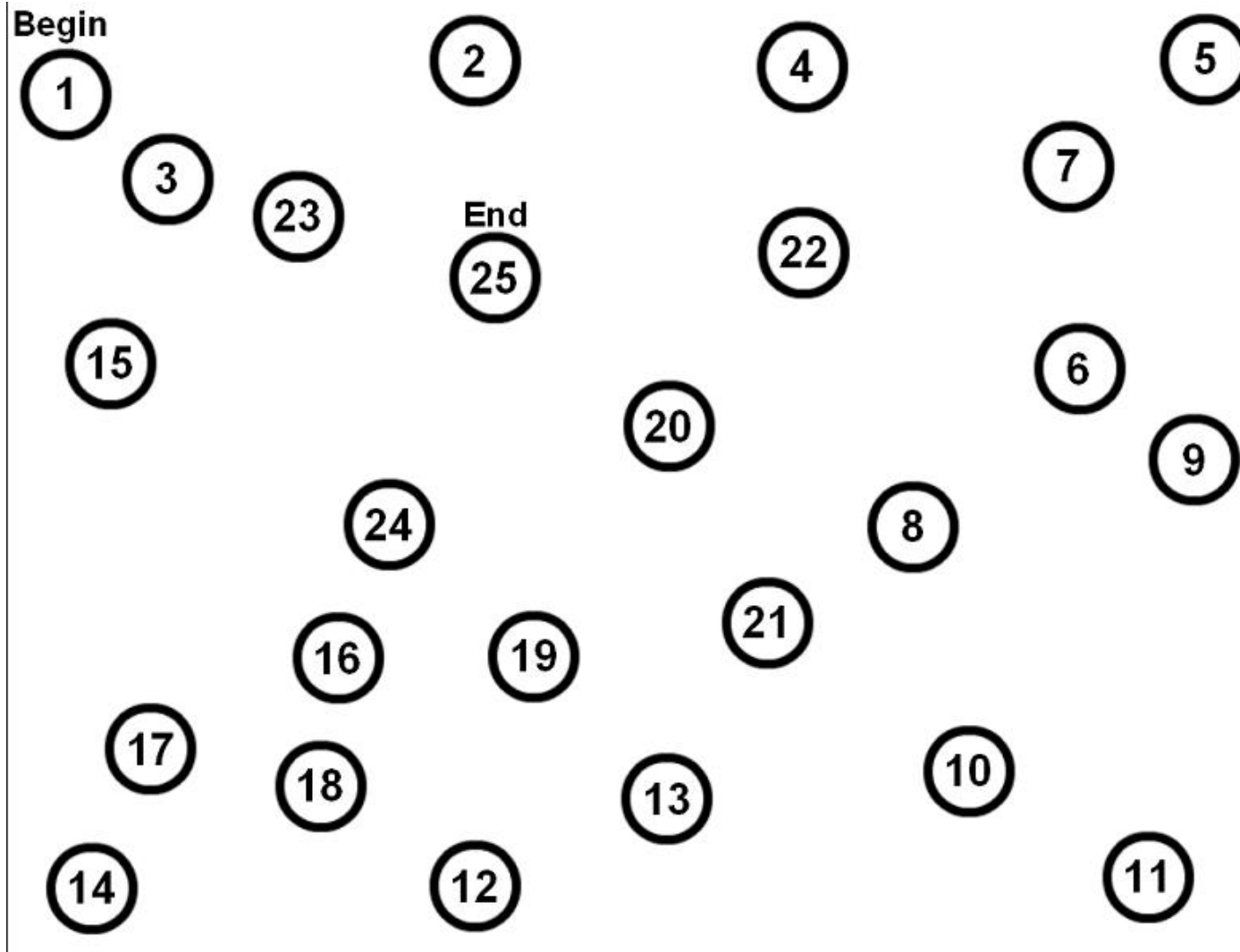
- What types of age-related functional decline have the greatest impact on traffic safety (crash risk)?
 - Based on epidemiological (case-control) studies using *objective, standardized* measures of functional ability to *prospectively* predict *crash involvement* in *large, representative* samples of (older) drivers:
 - > visual (contrast sensitivity)
 - > cognitive (speed of processing; visual search/divided attention; visuo-spatial ability [visualizing missing information]; working memory)
 - > physical (head-neck flexibility[rotation]; leg strength/mobility)

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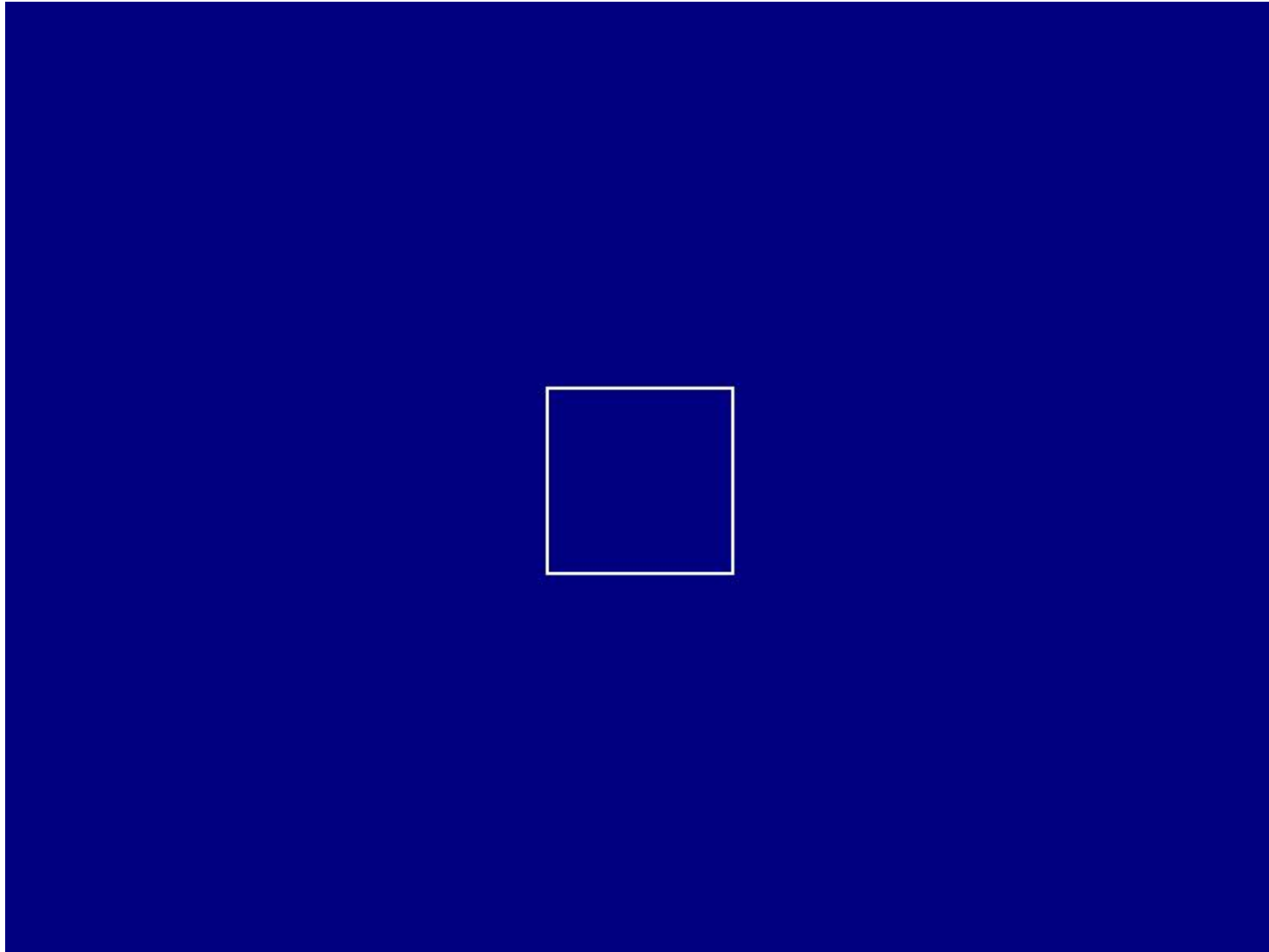
*The strongest predictors of crash risk (highest odds ratios) are measures of **cognitive abilities** that decline with normal aging.*

- Tests widely used to measure cognitive abilities validated as statistically-significant predictors of crash risk:
 - > Trail-making, Part B (visual search with divided attention)
 - > Useful Field of View (visual information processing speed)
 - > Visual Closure: Motor-Free Visual Perception Test (visuo-spatial ability)

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Which object appeared in the center of the screen?



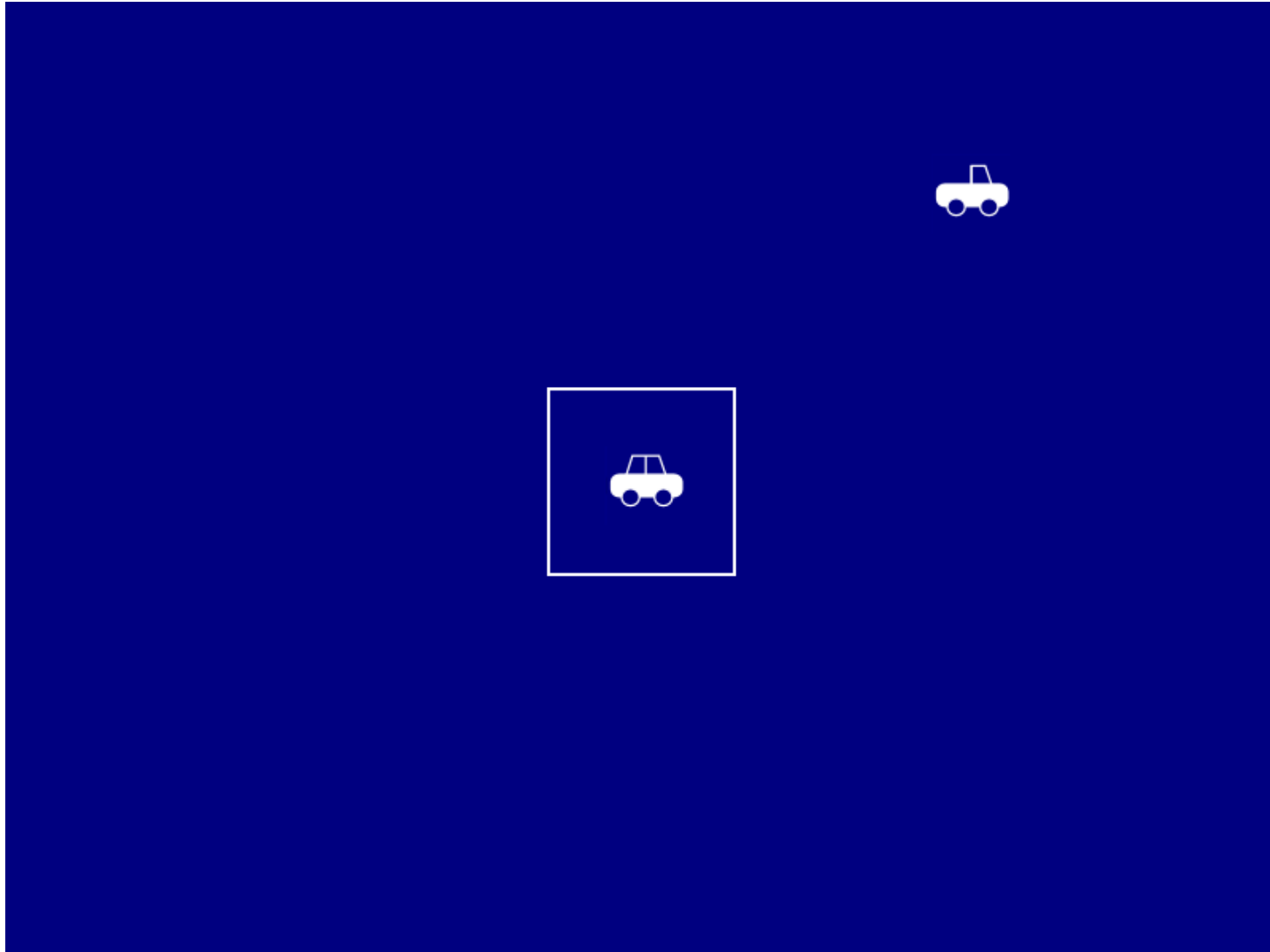
OR



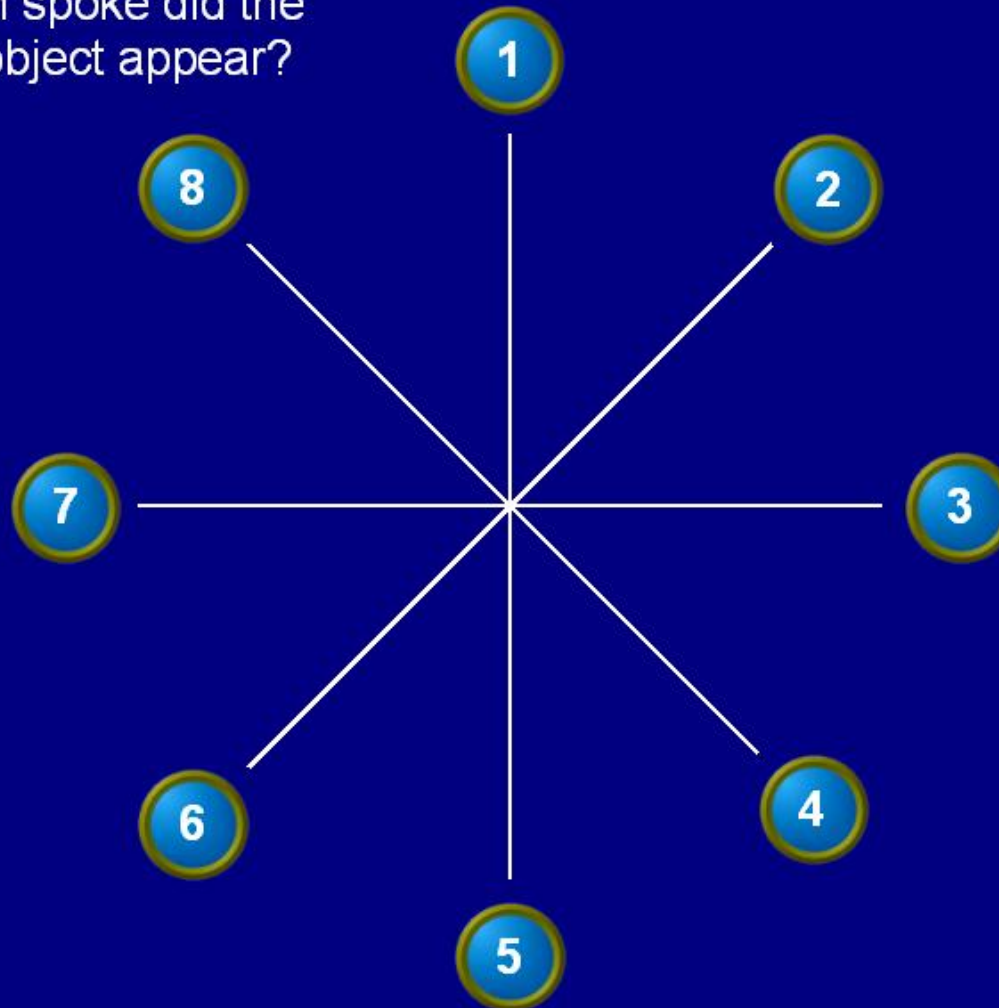
Car

Truck

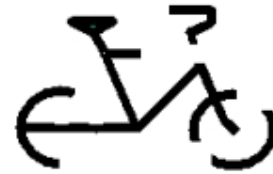
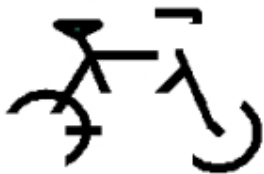
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On which spoke did the
outside object appear?



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Can data from these measures – Trails, UFOV[®], and MVPT – provide a reliable estimate of the extent to which the aging driver population in the U.S. experiences a degree of cognitive decline that results in a significant increase in crash risk?

- To answer this question ...

1. Aggregate an appropriate analysis dataset ($n > 4,000$)

- *Model Driver Screening and Evaluation Program: Maryland Pilot Older Driver Study*, NHTSA Contract DTNH22-96-C-05140.
- *Older Drivers: Relationship Between Assessment Tool Scores and Safety Outcomes*, NHTSA Contract DTNH22-05-D-05043.
- *Older Driver Assessment Scores, Citations, and Crashes*, NHTSA Contract DTHN22-09-D-00135.
- *Predicting Long-Term Mobility Outcomes for Older Adults*, NIH Grant R01 AG021958.
- *Naturalistic Driving Study*, Second Strategic Highway Research Program (SHRP2)

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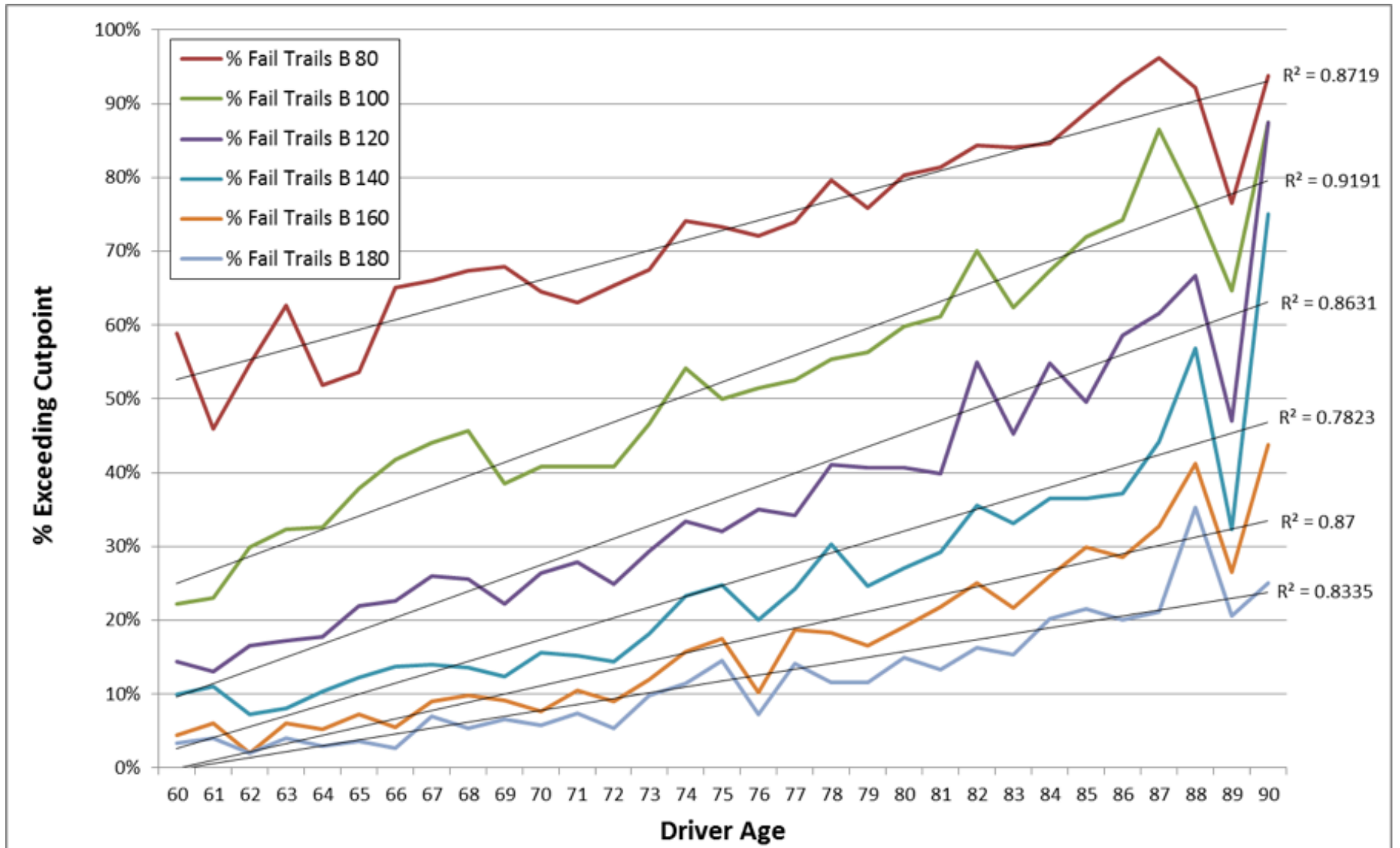
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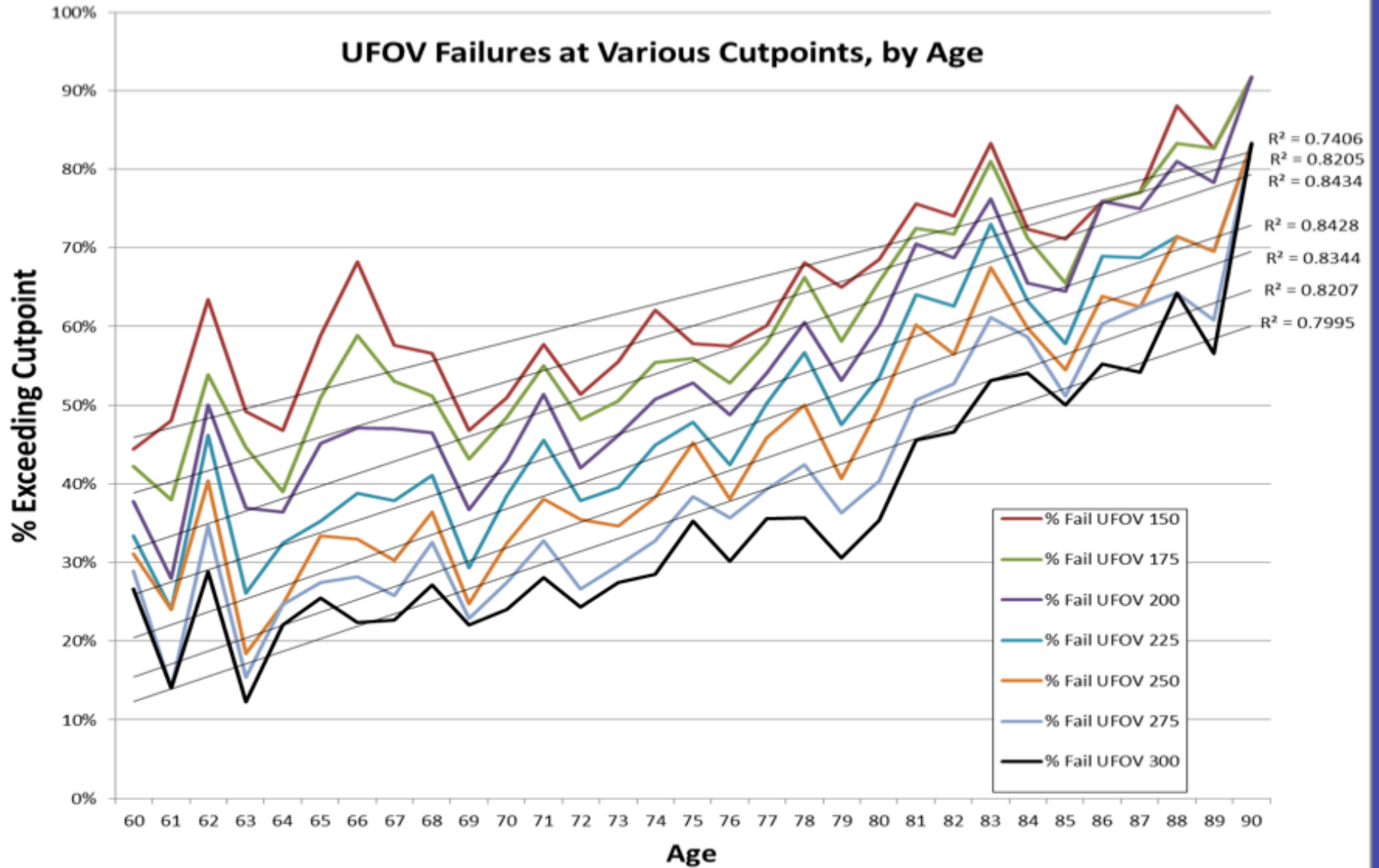
2. Apply pass/fail cutpoints that are the most defensible based on current evidence:

- Trails B: 80–180 sec
- UFOV[®]: 150–300 msec
- MVPT: 3–7 errors

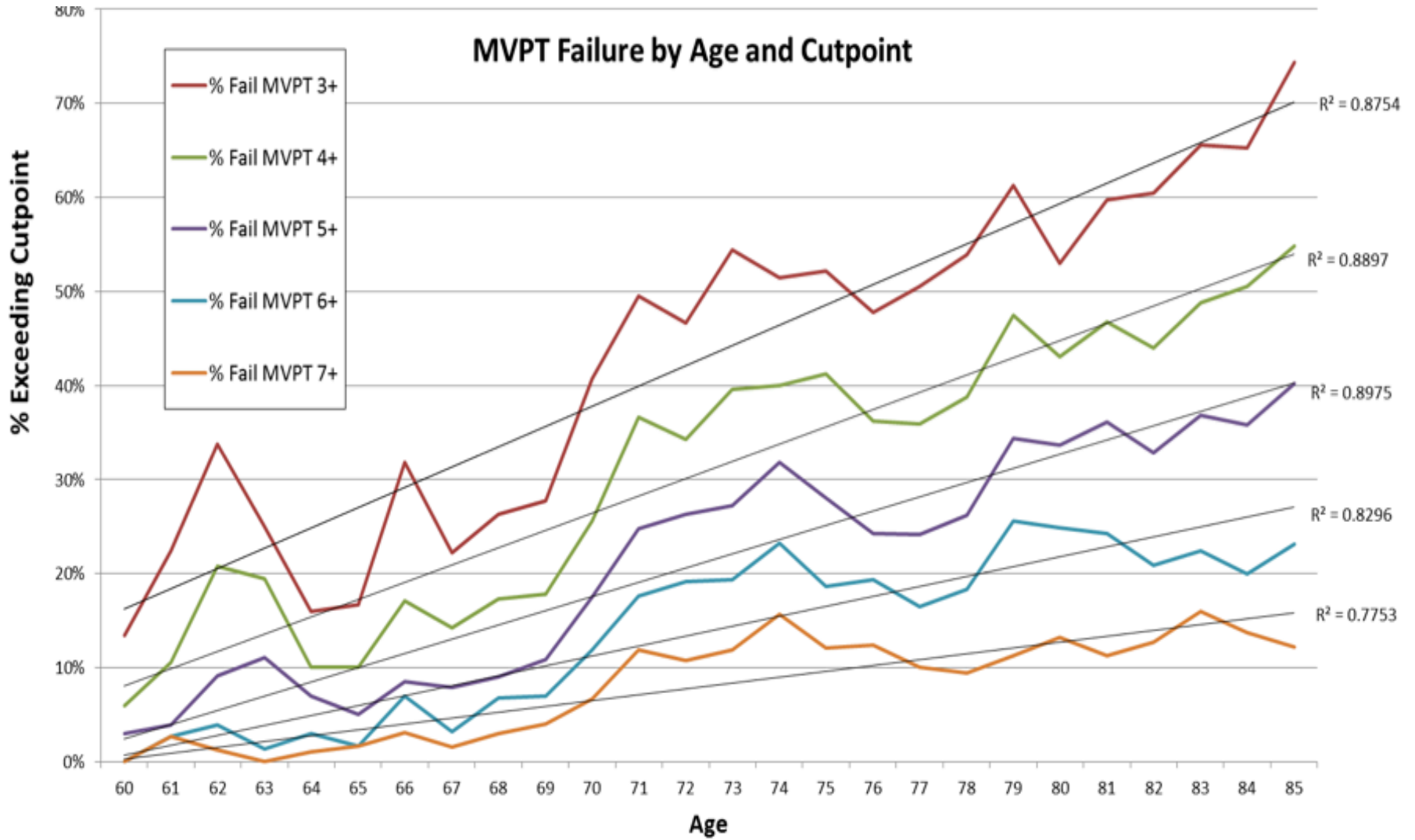
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- In conclusion ...
 - > The most methodologically sound investigations of the relationship between aging and crash involvement have shown that older drivers with deficits in specific functional (cognitive) abilities are at significantly higher risk of crash involvement, using tests that are objective, valid, and practical.
 - > The percentage of (all) drivers who are at higher risk of crash involvement due to age-normal cognitive decline increases with increasing age.
 - > Older drivers will comprise a growing segment of the CMV workforce and may be expected to account for an increasing share of crashes (fatal and non-fatal) in the years ahead.
 - > Including a brief cognitive screen in the regular, 2-year medical certification process and/or by DMVs at license renewal for those with endorsements for CMV operation would yield measurable traffic safety/public health benefits; but this remains politically sensitive.