Reality Check

What can we expect from our drivers?

What can we do about it?

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Many advocates envy European spaces

You are not the Netherlands


You have
places like
theirs


They have
places like yours

You are Texas

oped on Horseback

~6 mile range

Urban environments get different behaviors

Why?

4 years of driver behavior, in the wild

- SHRP2 NDS Video Tabulations
- SHRP2 Speed, acceleration, jerk
- Pre/post crash analysis
- Visual preference surveys

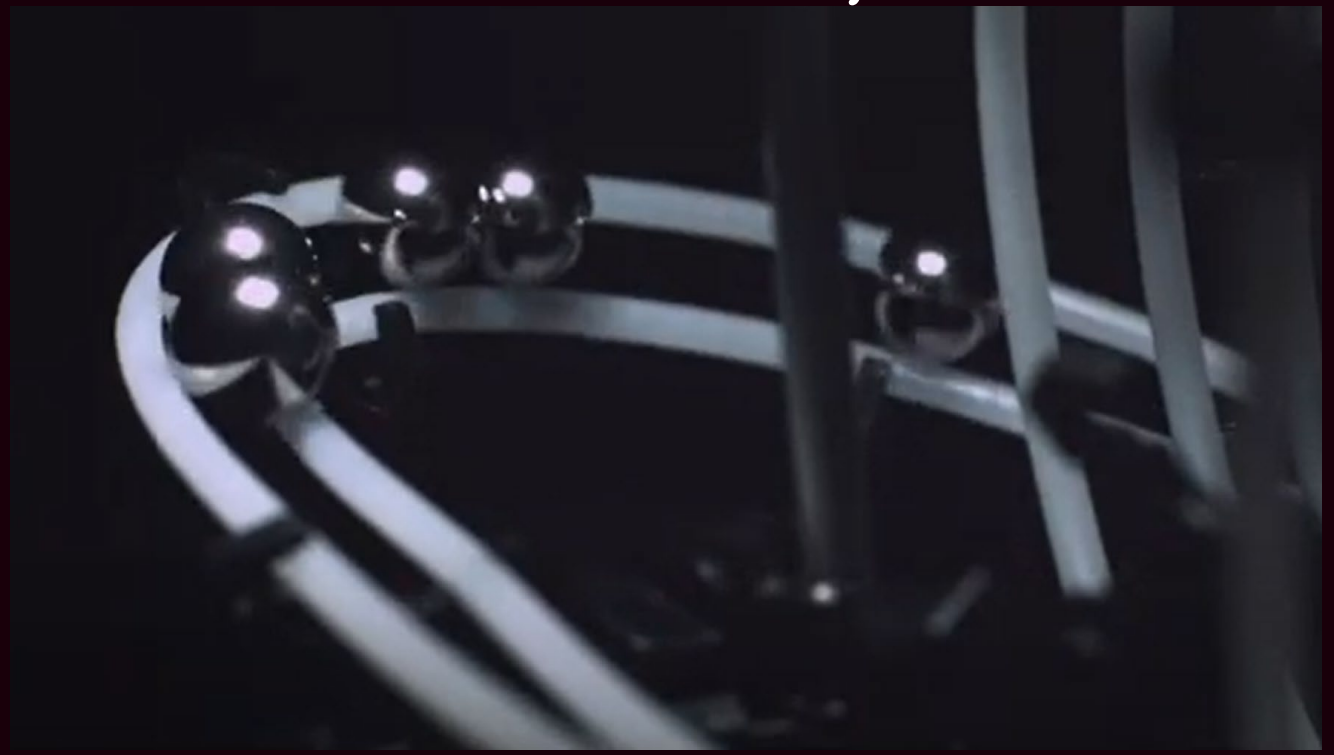
The Surprise Takeaway:

I wanted a magic bullet I could build…

It was never about what we build.

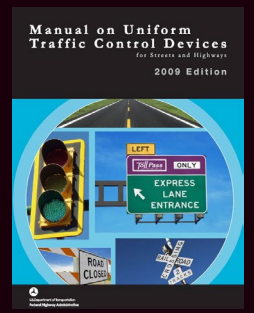
It’s all about seeing people.

Roads: Point Mass Physics

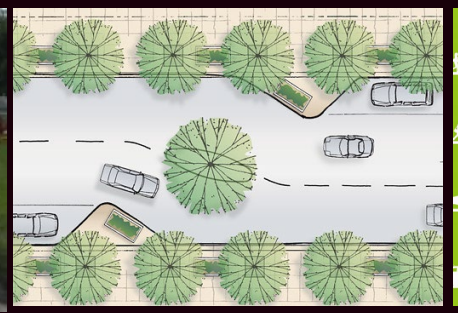


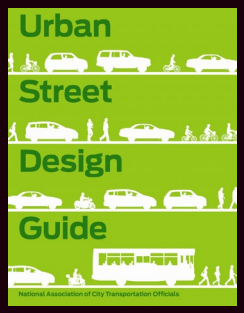
Streets: Social Psychology

Adjusted for Human Factors



Adjusted with physics if needed





Reality Check: TTI Pedestrian Safety
https://www.youtube.com/watch?v=6EJW-_rr-X4

System 2: Slow

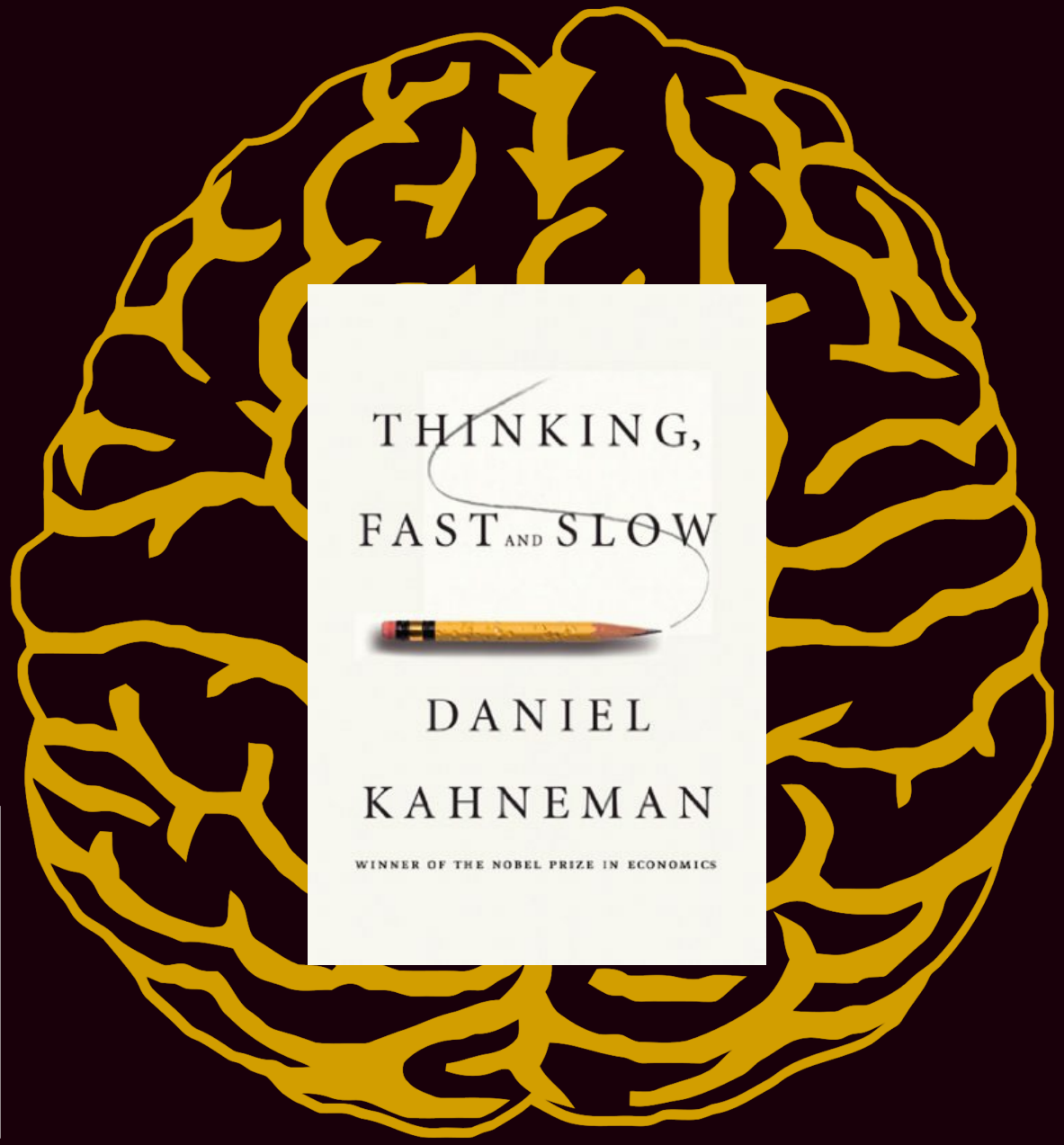
Trained by learning and conversing

Logical, Sequential

Verbal

Understanding

This is one that takes tests



System 1: Fast

Trained by experience

Probabilistic

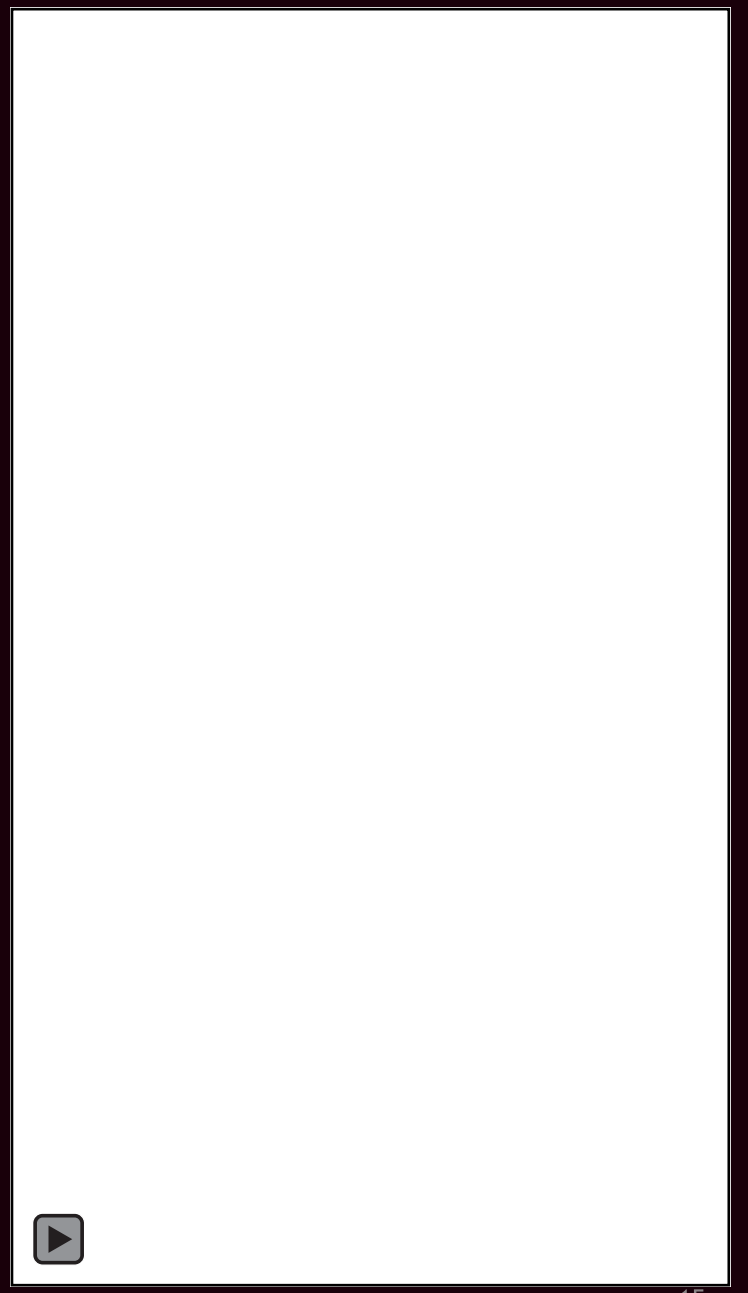
Monitoring

Self-preservation

This is one you want driving

DWA: Driving Without Awareness

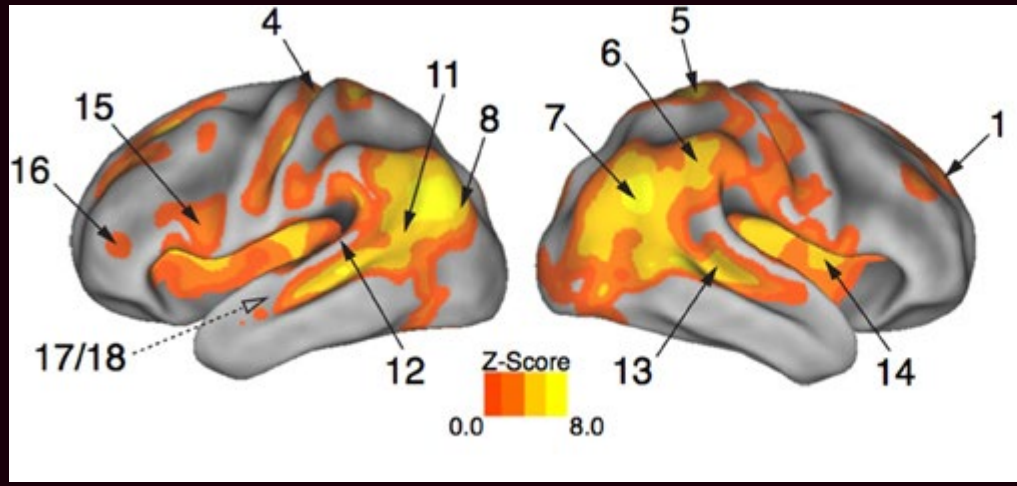
- Once we learn, we quit watching ourselves drive
- **We are conscious, just not very…**
- System 1 **can** see people

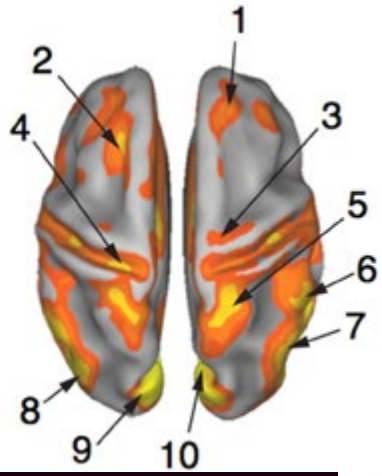


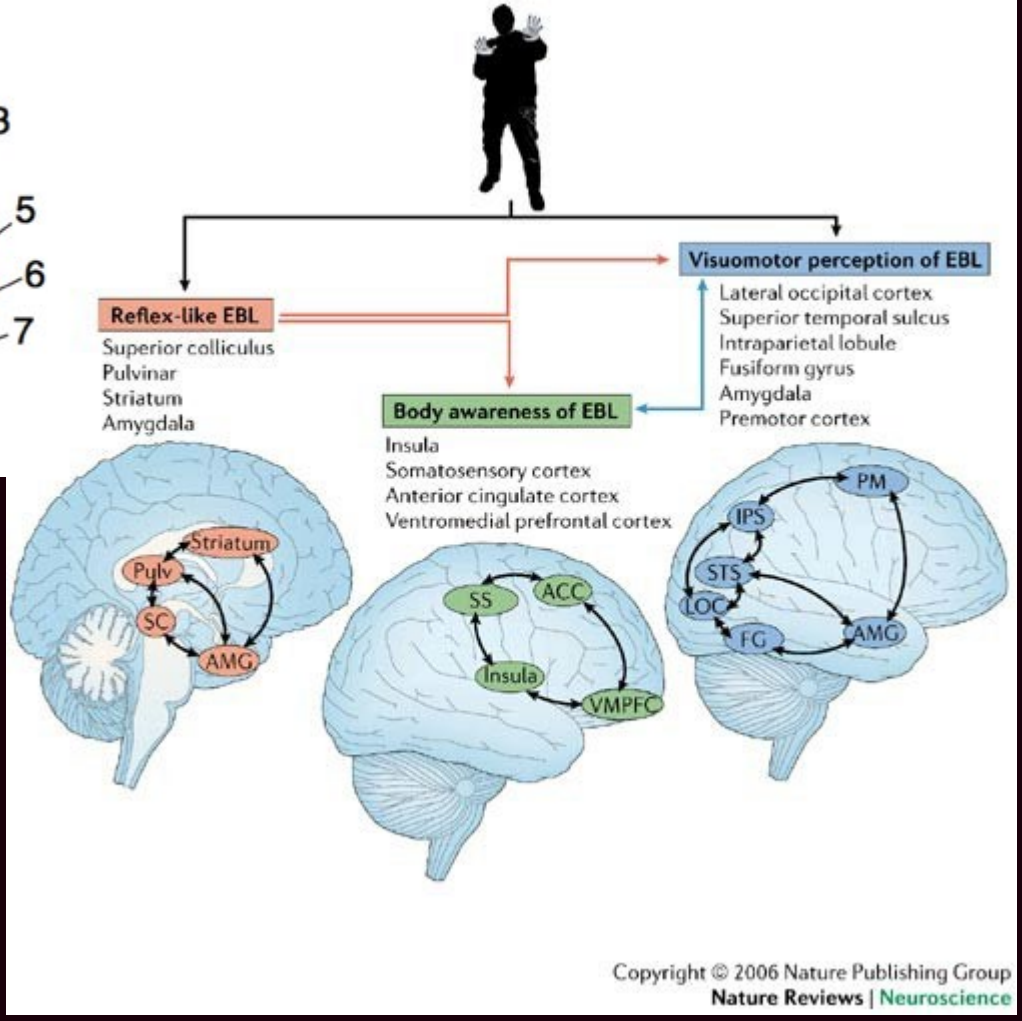
Credit: @Sapphire_achilles

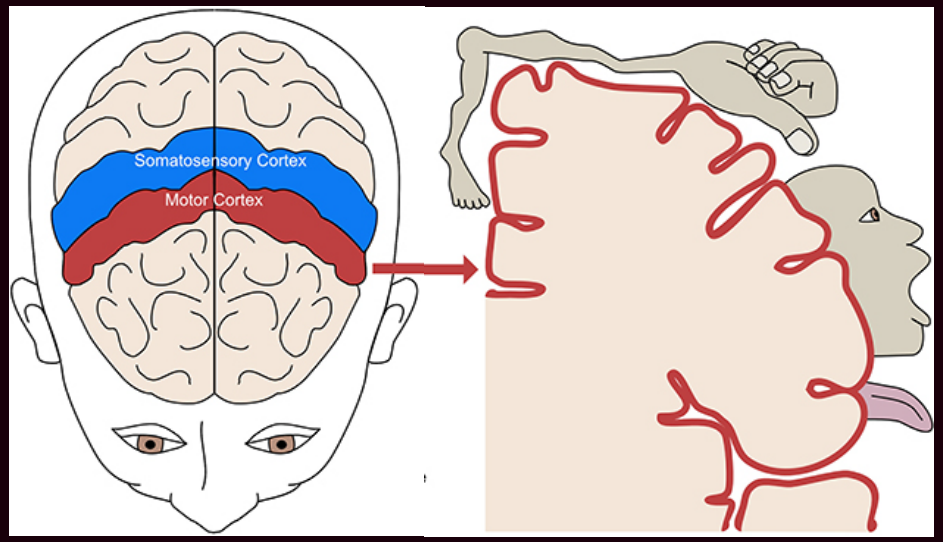
Harms, I. M., van Dijken, J. H., Brookhuis, K. A., & De Waard, D. (2019). Walking without awareness. *Frontiers in psychology*, *10*, 1846.

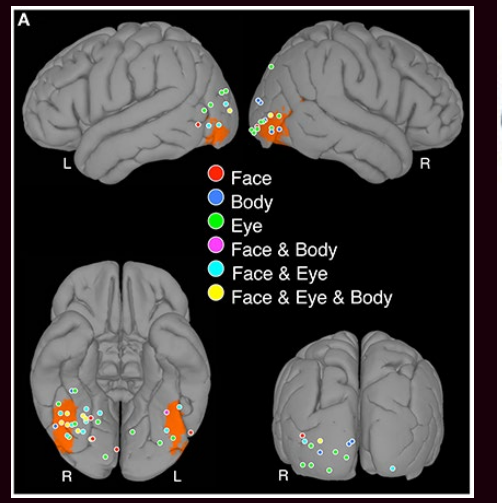
People on the brain











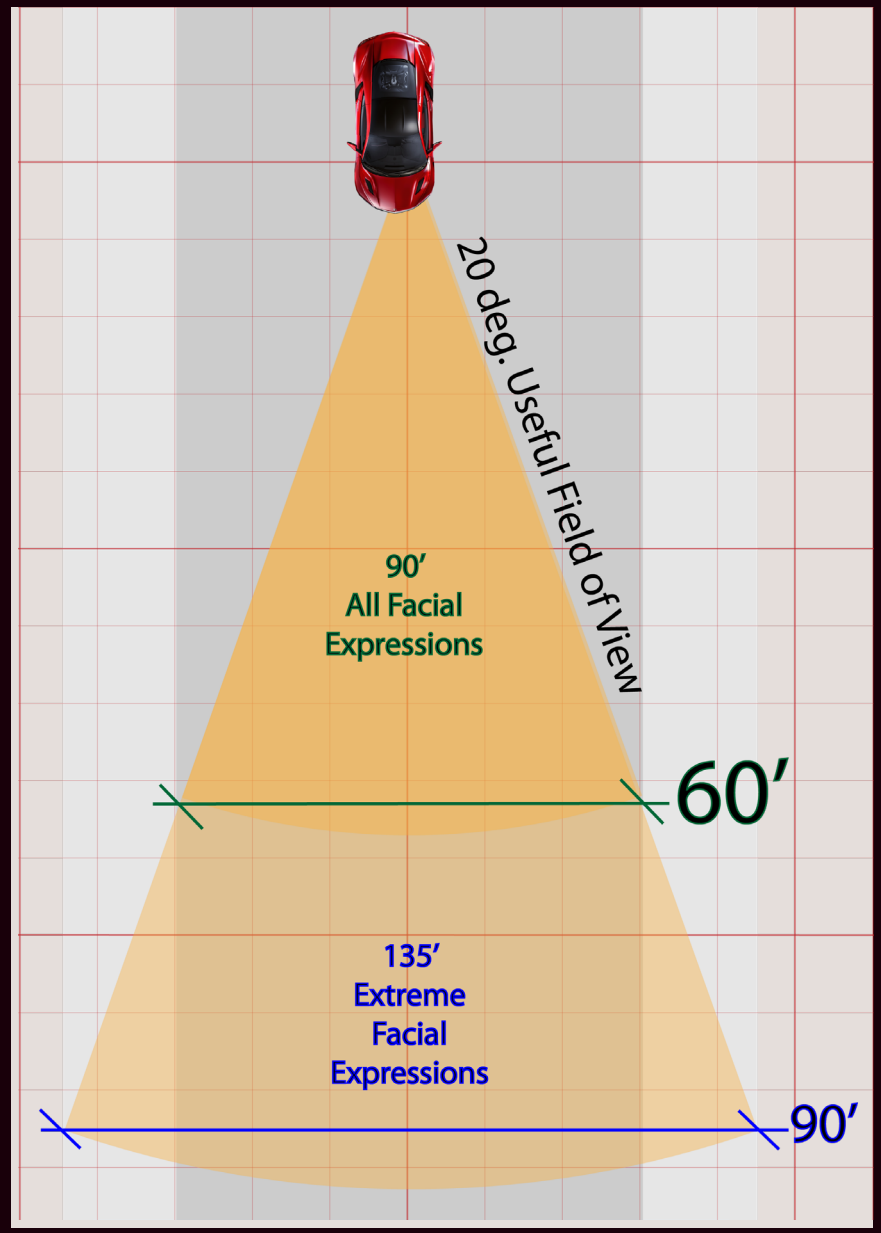
Engell, A. D., & McCarthy, G. (2014). Face, eye, and body selective responses in fusiform gyrus and adjacent cortex: an intracranial EEG study. *Frontiers in human neuroscience*, *8*, 642.
Tipper, C. M., Signorini, G., & Grafton, S. T. (2015). Body language in the brain: constructing meaning from expressive movement. Frontiers in human neuroscience, 9, 450.
De Gelder, B. (2006). Towards the neurobiology of emotional body language. Nature Reviews Neuroscience, 7(3), 242-249.

Limitations:

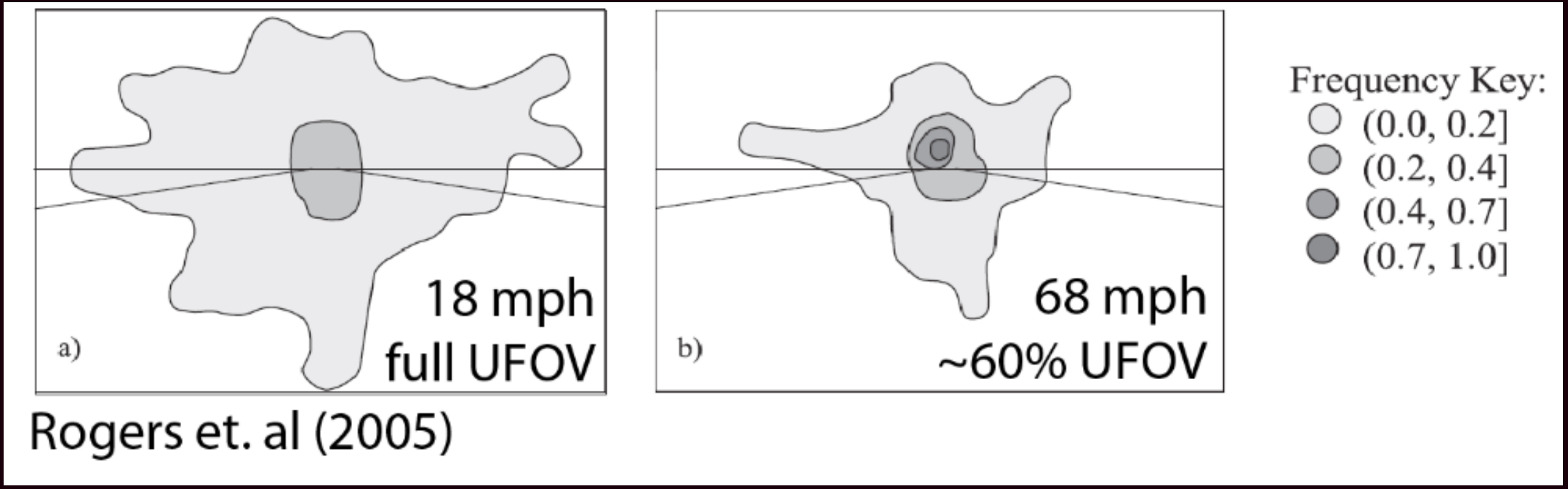
Plan view:

- Interaction Possibilities:
  - 90-135 feet
- Driver uses a 20 degree view

➢**Yields a 60-90’ wide corridor**



What about speed and Perceptual Narrowing?

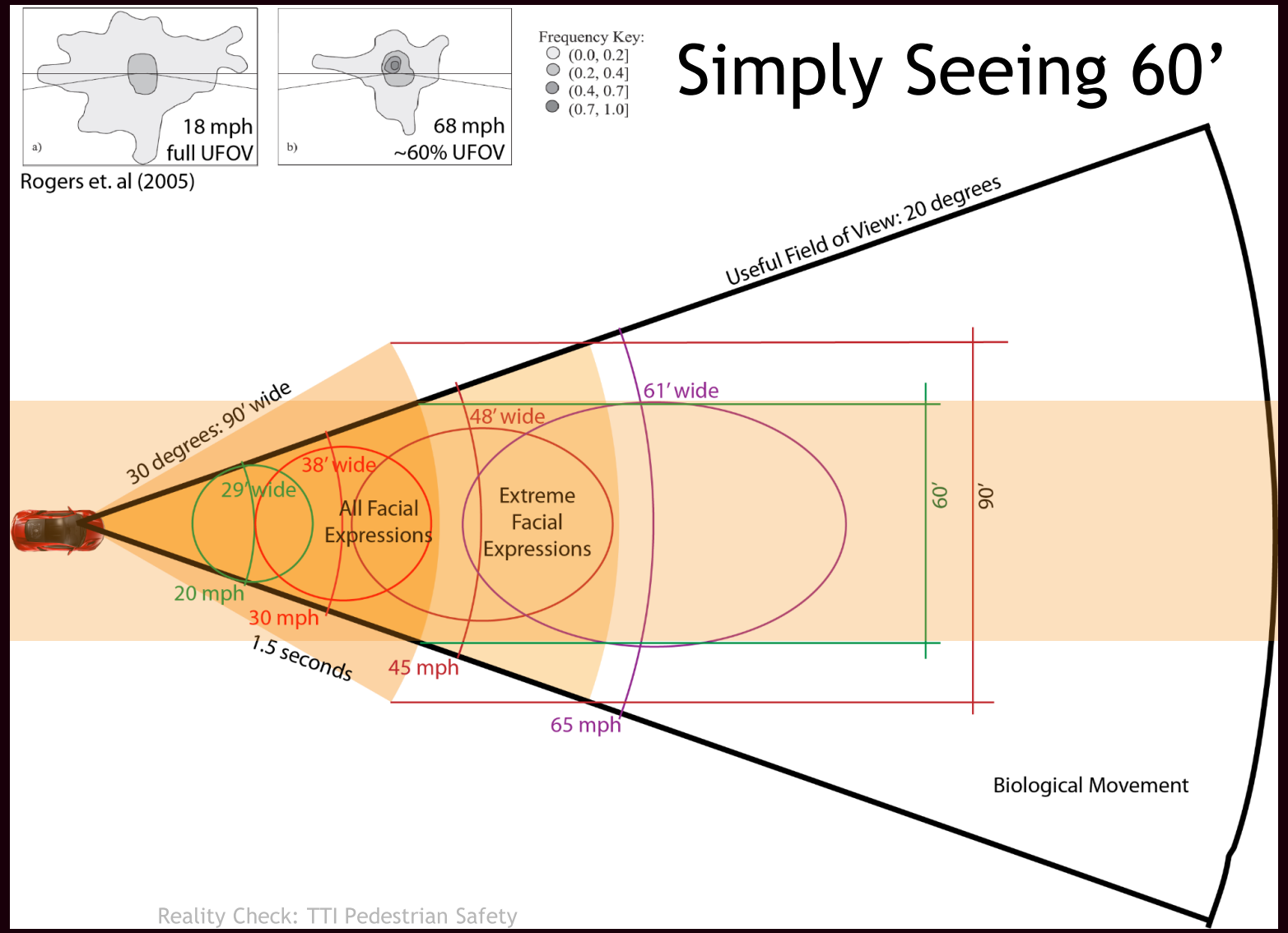


Rogers et. al (2005)

Rogers, S. D., et al. (2005). "Gaze patterns in the visual control of straight-road driving and braking as a function of speed and expertise." Ecological Psychology **17(1): 19-38.**

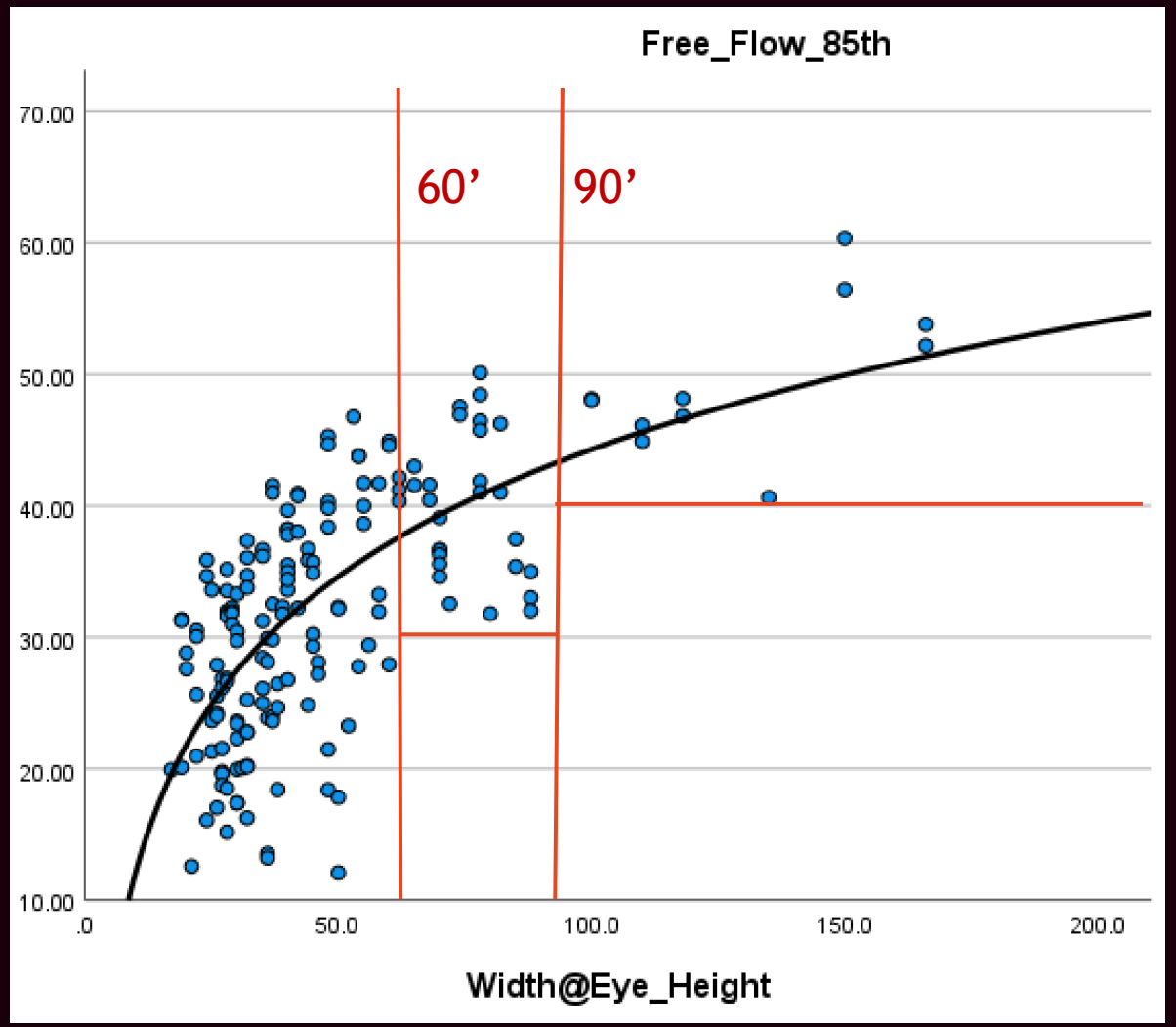
How far ahead are you looking?

Perceptual Narrowing



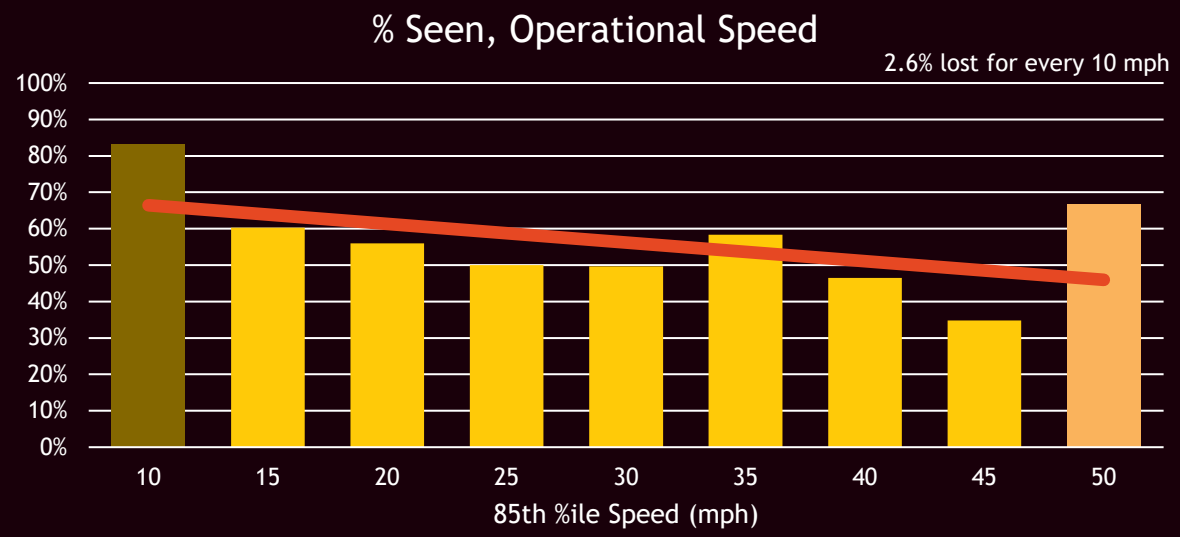
Width at eye height
Visual Width of the Corridor

Visual Corridor Width



Processing Limitations:

- Speed
  - Too fast and there's not enough time to process someone is there



Where am I more likely to see people?

KEEPING THEIR ATTENTION

Maintaining attention requires novelty and change over time

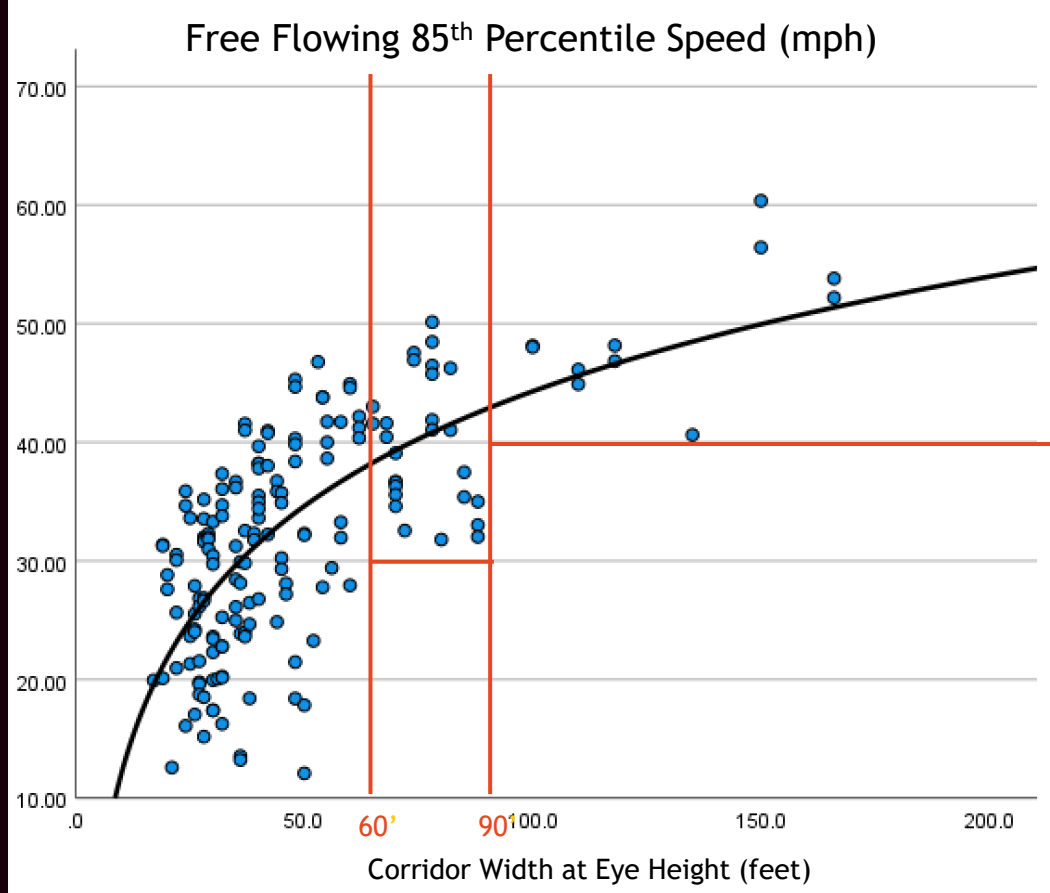
Interruptions require reorienting

3 Factors:

1. People
2. Close enough
3. Frequent change

Speed Prediction:

- Corridor width: visual width at eye height
  - Can use building face width (different equation)
- People: Doorways per 100 feet
- Interruptions: Block Length



85th Percentile Speed in mph: (R^2=0.615)

-5.26
+ 9.9 Ln(Corridor Width at Eye Height)
– 1.58 (Doors/100')
+ 0.0068 (Block Length)

SD: 6.3 mph

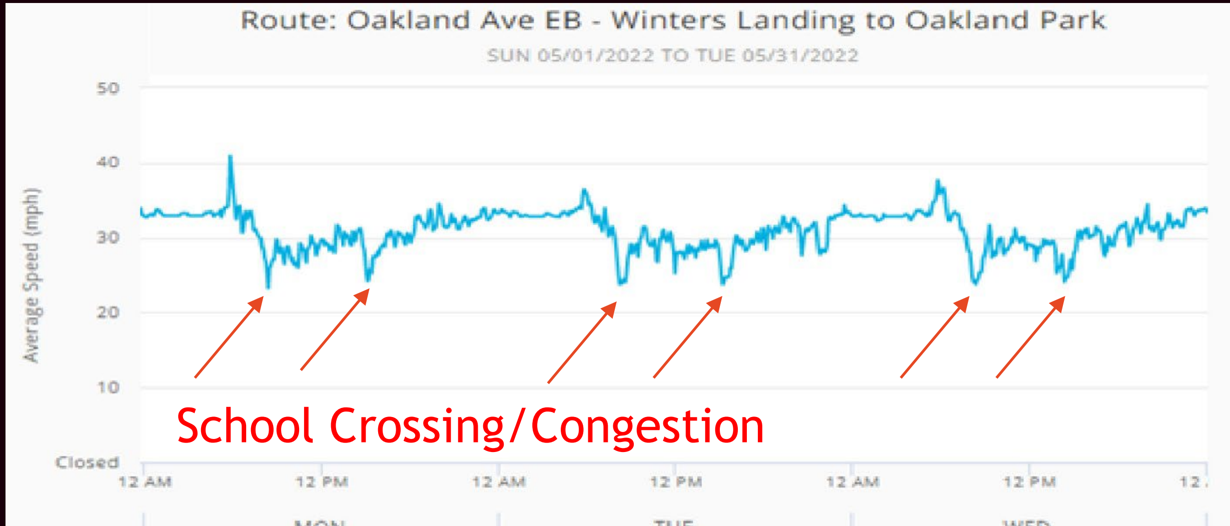
Necessary but not sufficient:

38’ width at eye height

People vs. none

Prediction with all variables

Prediction w/o doorway density



Source: Iteris

Access Management

- Speed Management: 202
  - Losing a block means doubling the block length
- You'll add 10 mph going from 660' to ½ mile

TXDOT Access Management:

Table 1-2: Access Points and Free Flow Speed

Access Points and Free Flow Speed	
Access points per mile	**Reduction in free flow speed, mph**
0	0.0
10	2.5
20	5.0
30	7.5
40 or more	10

Think Context