

# Human Factors in Crash Reconstruction

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# Human Factors

- Strategy and Tactics
- Perception and Reaction

# Driving Strategy

- Any action while a driver, or pedestrian is on a trip, which increases the probability of success of future evasive tactics.

This includes:

- Perceive potentially hazardous conditions
- Decide on speed, road position and observations
- Adjust speed, position and heading

# Driving Tactics

- Evasive action taken by a driver or pedestrian to avoid a perceived hazard, usually involving braking, steering, accelerating or a combination of these to avoid an accident.

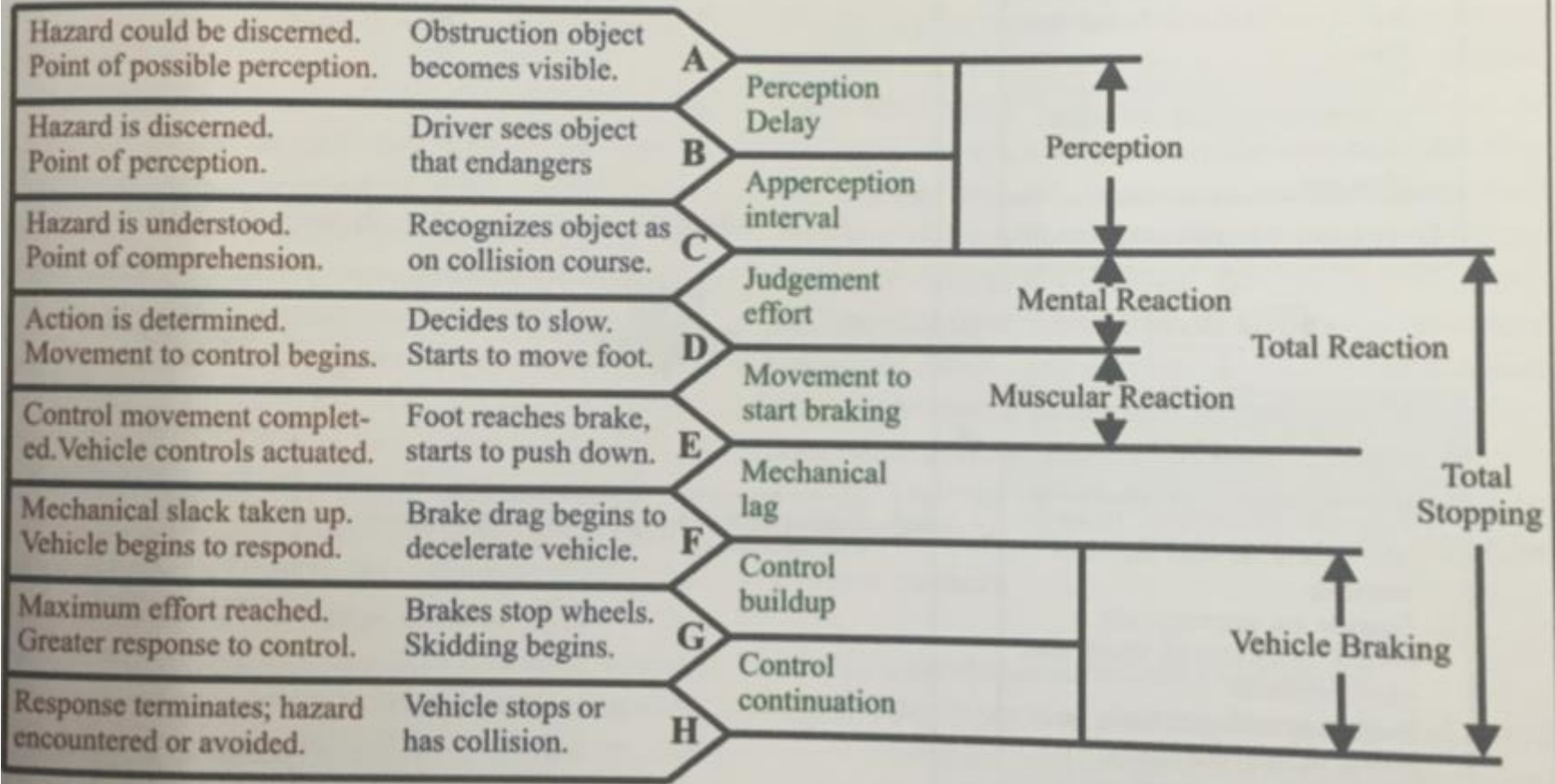
# Perception and Reaction

- **Perception** - The general process of detecting some object or situation and comprehending its significances.
- **Reaction** – a person's voluntary or involuntary response to a hazard or other perceived situation or sensory stimulus.

Steps In Evasive Tactics To Avoid Hazard

Example: Avoiding Moving Object By Stopping Vehicle

Time And Distance Intervals



# Stopping distances under ideal driving conditions



110 km/h



**126**  
(metres)



100 km/h



**108**  
(metres)



80 km/h



**76**  
(metres)



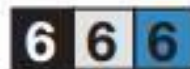
50 km/h



**37**  
(metres)



30 km/h



**18**  
(metres)

- Perception distance
- Reaction distance
- Braking distance

# Reaction Time

- The time from perception to start of reaction. Also “Reaction Distance” the distance traveled during the reaction time of a moving object.



# Reaction Time Categories

- Simple - to expected stimuli, i.e. a stop light change
- Complex – to unexpected stimuli requiring significant mental analysis and decision making, i.e. a deer running onto the road.
- Point of Possible Perception

# Typical Driver Reaction Times

## Mental Process Only

- Simple 0.3 – 1.0 seconds or more  
0.75 s a good assumption
- Complex .7 – 1.3 sec. or much more  
1.0 – 1.25s good assumption range

# Muscular Moment

- Foot accelerator to brake typically  
0.2 to 0.3s or more
- Steering input begins to occur immediately

If both steering and braking are intended,  
steering will start first.

# Perception Delay

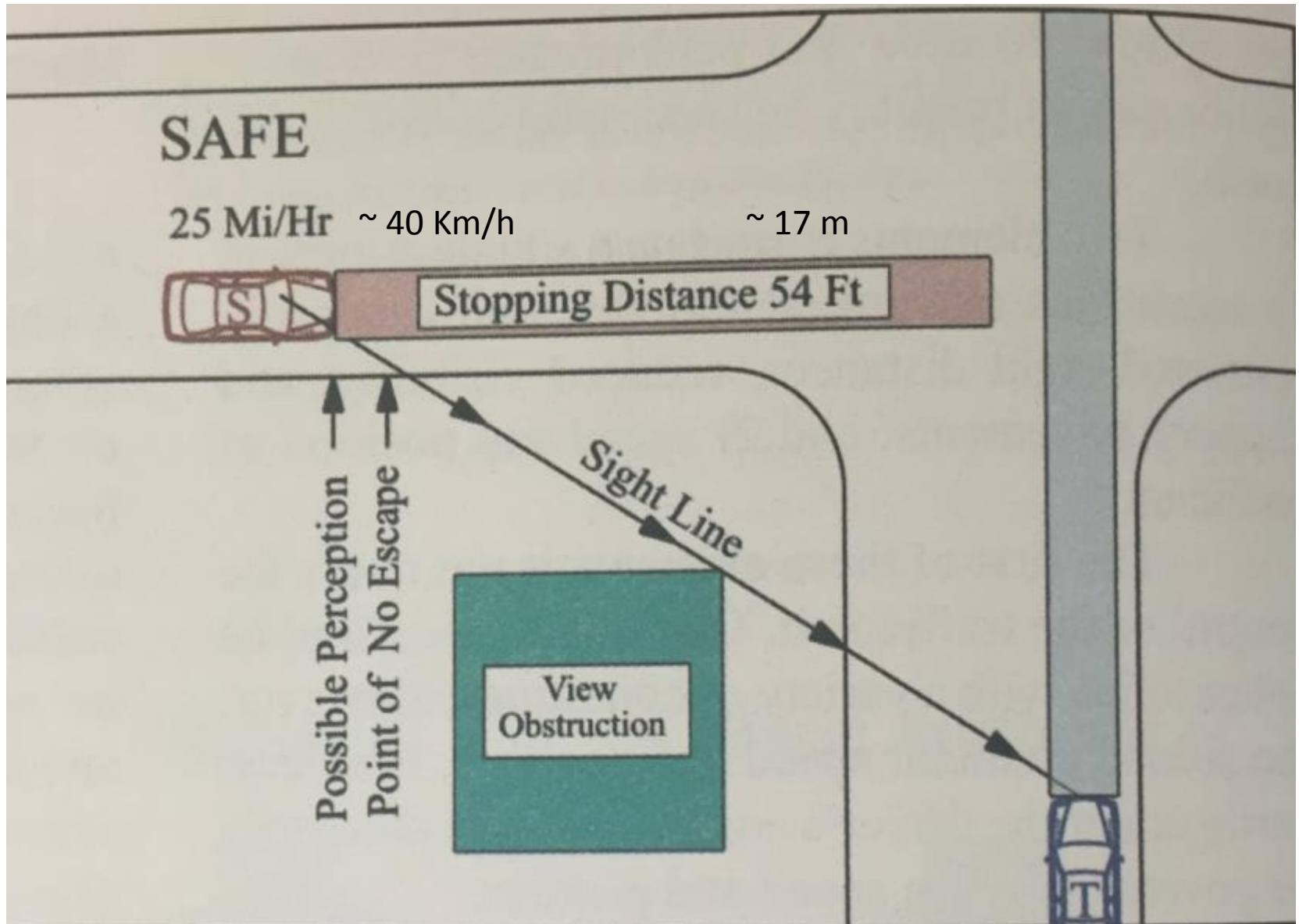
From “Point of Possible Perception”  
to the point of actual perception,  
time and/or distance.

A common cause of accidents due to:

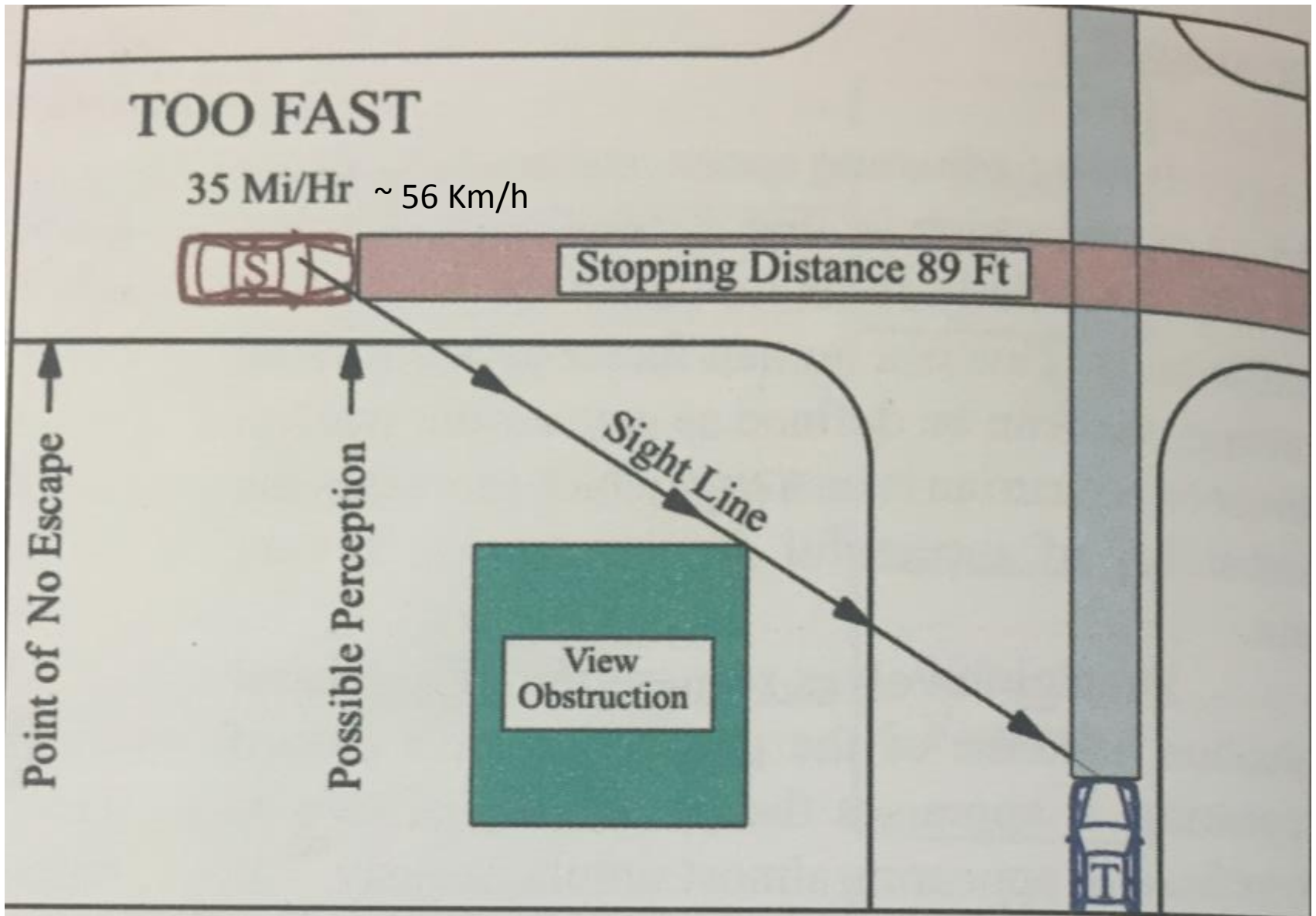
- Distractions
- Intoxication
- Drowsiness
- Fatigue
- Unfamiliarity

# Reaction Delays

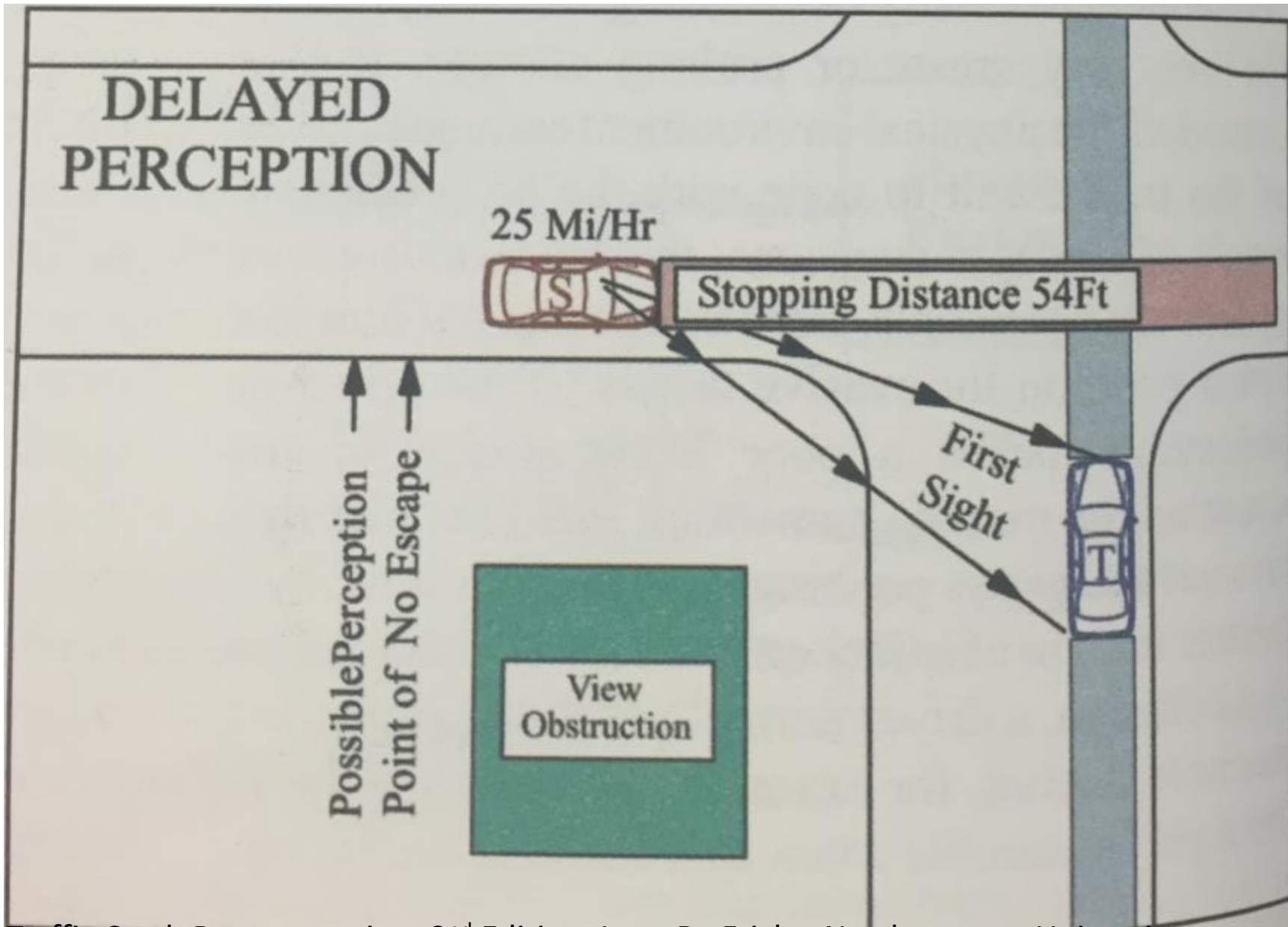
- Intoxication
- Age
- Startle Effect
- Unfamiliarity



Traffic Crash Reconstruction, 2<sup>nd</sup> Edition, Lynn B. Fricke, Northwestern University, Center for Public Safety



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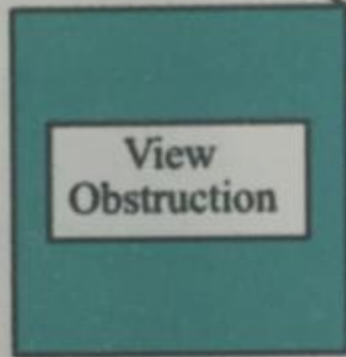
# WRONG TACTIC

25 Mi/Hr



Decision to Steer

Possible Perception  
Point of No Escape



Sight Line



# FAILURE TO YIELD

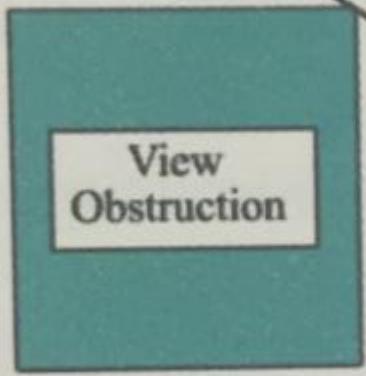
25 Mi/Hr



No Decision to Stop

Possible Perception  
Point of No Escape

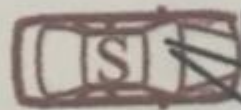
Sight Line



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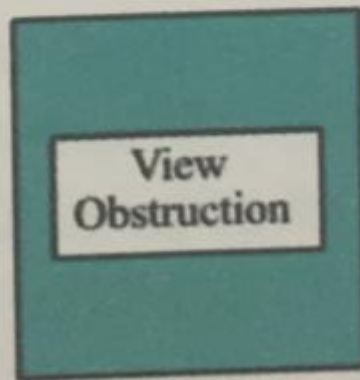
# COMBINATION OF MISTAKES

35 Mi/Hr



Stopping Distance 89 Ft

First Sight



Point of No Escape

Possible Perception

# Thank You

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