

Studying the Vehicle Headway Issue and Its Impact on the Slow-Down Effect

Alvin Nieves
Miao Song
Dr. Jay Wang

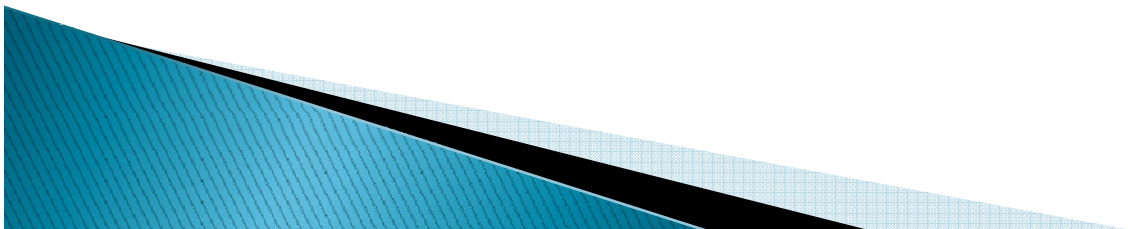


July 2008

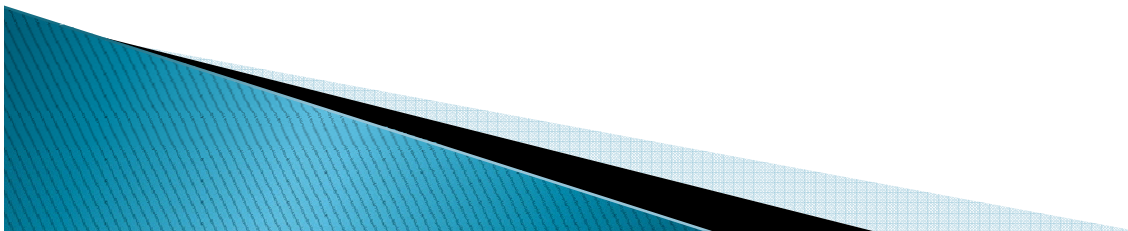


Outline

- ▶ Give a background on tailgating.
- ▶ Describe vehicle headway issues.
- ▶ Reaction times associated with vehicle headway.
- ▶ Tailgating treatment systems.
- ▶ Proposed survey.

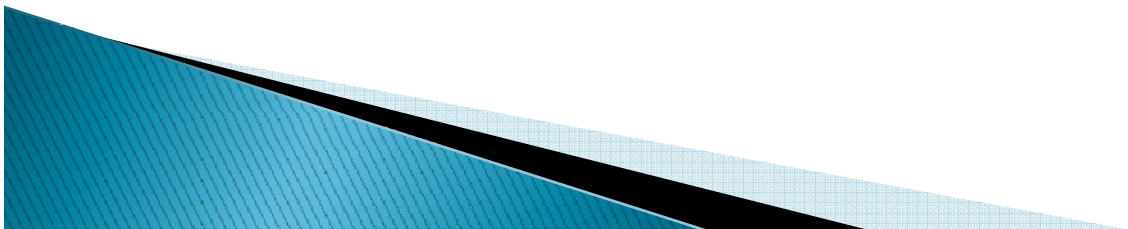


Tailgating



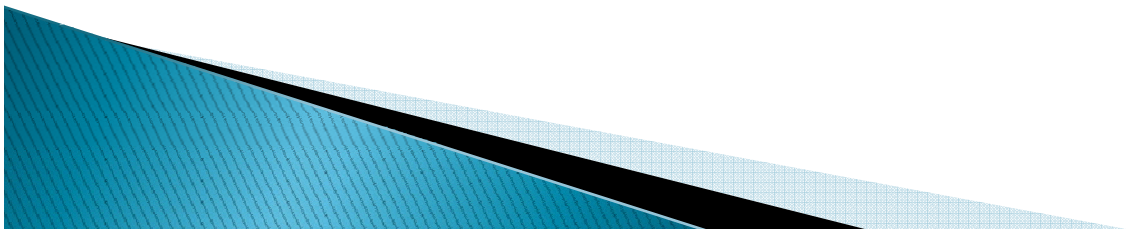
Aggressive driving

- ▶ According to the National Highway Traffic Safety Administration (NHTSA):
 - *“An individual committing a combination of moving traffic offenses so as to endanger other persons or property.”*
- ▶ In Rhode Island:
 - *“Operating a motor vehicle in violation of any speed law and a violation of two or more of traffic law provisions.”*



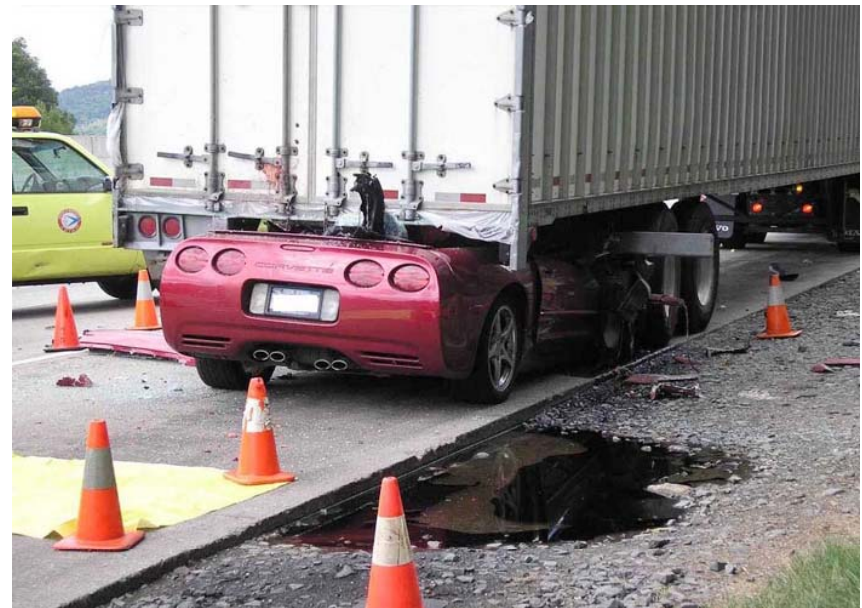
Why tailgating is considered aggressive driving?

- ▶ Involves a combination of moving traffic offenses.
- ▶ Endangers other persons or property.
- ▶ Against the law.



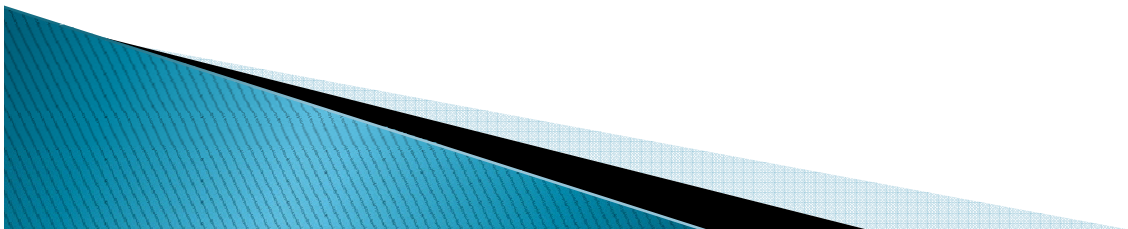
Accidents

- ▶ 6.5 million accidents per year.
 - 2.5 involved reduced vehicle headways.
- ▶ Every year there are 12,000 fatalities.
- ▶ In Rhode Island, speeding accounts for 52% of all statewide fatalities.
- ▶ The national average is 32%.
- ▶ Major causes
 - Drivers' inattention
 - Tailgating



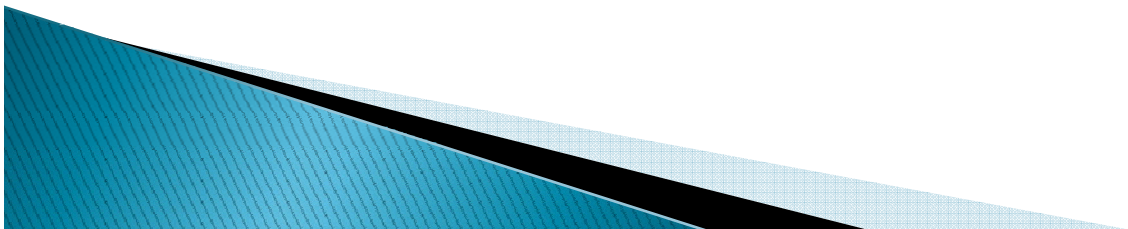
Vehicle Headway

- ▶ The vehicle headway depend on:
 - Driver behavior
 - Traffic condition
 - Road condition
 - Roadway design
 - State laws
 - Regulations



Tailgating practice

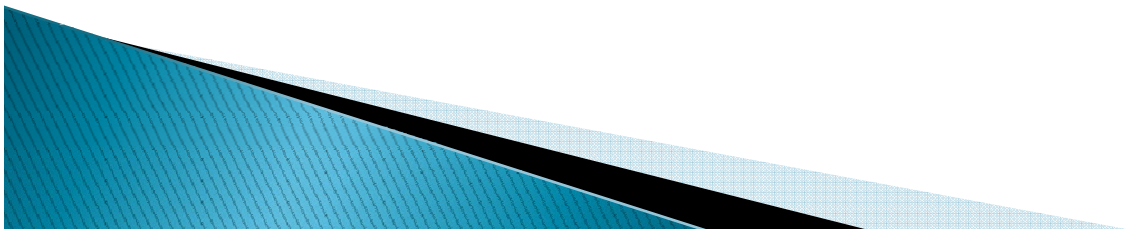
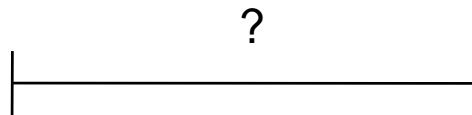
- ▶ Reasons for tailgating:
 - Heavy traffic
 - Slow car ahead
 - In a hurry
 - Poor visibility
 - Distraction
 - Weather conditions
 - Hypermiling



Proper vehicle headway

Suppose a speed of 60 mph.

What is the proper vehicle headway?



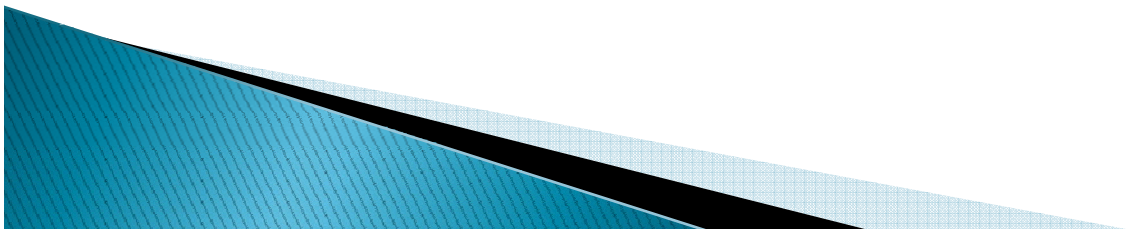
What is a car length?

- ▶ Varies from person to person.
- ▶ Not easy to measure.

A car length

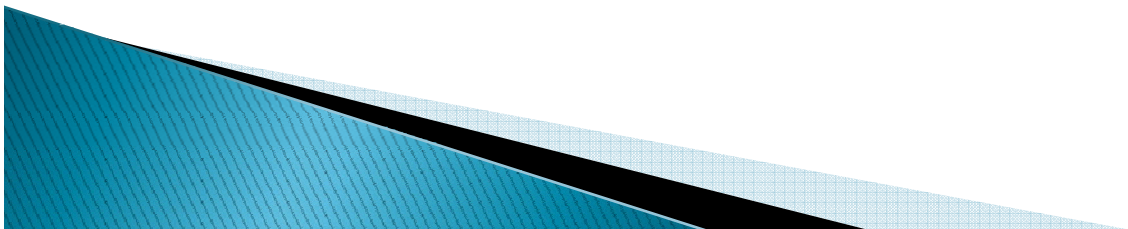


A car length



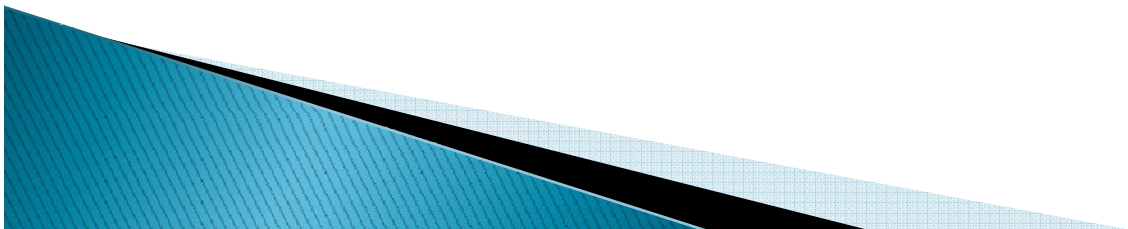
Reaction time

- ▶ Varies from person to person.
- ▶ Three stages
 - Perceiving the object
 - Make a decision
 - Apply the brakes
- ▶ Can take 0.7 s to 2.5 s.

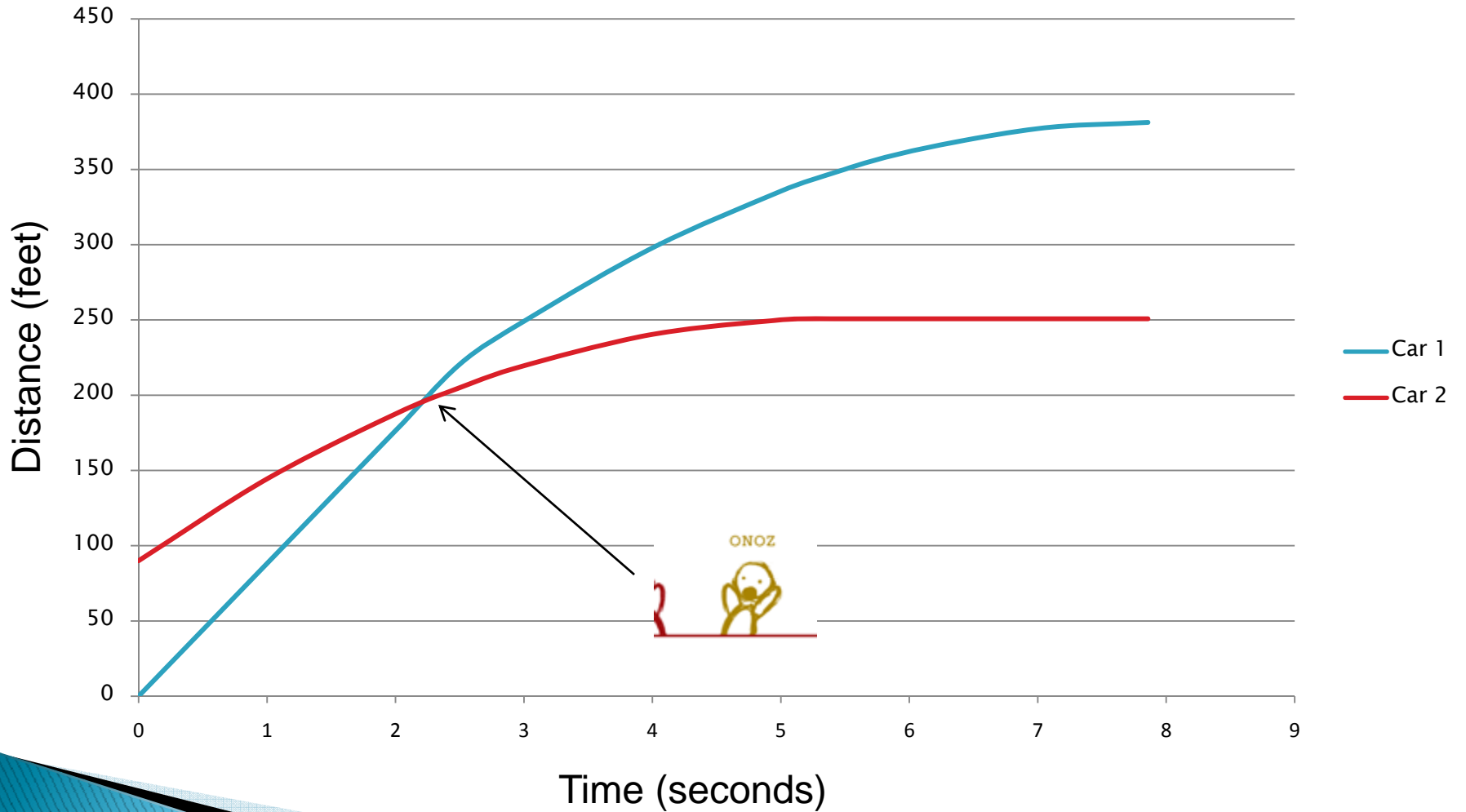


Situations

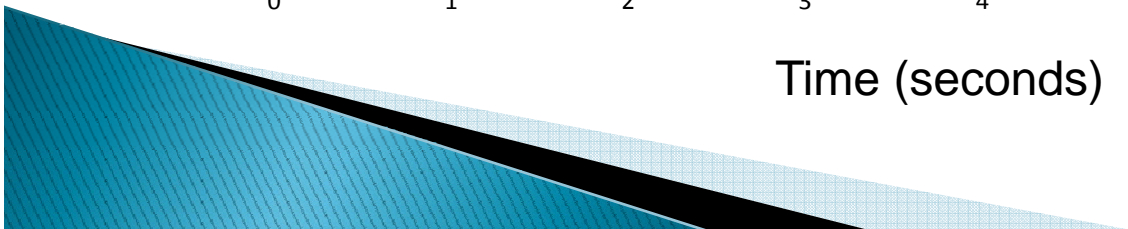
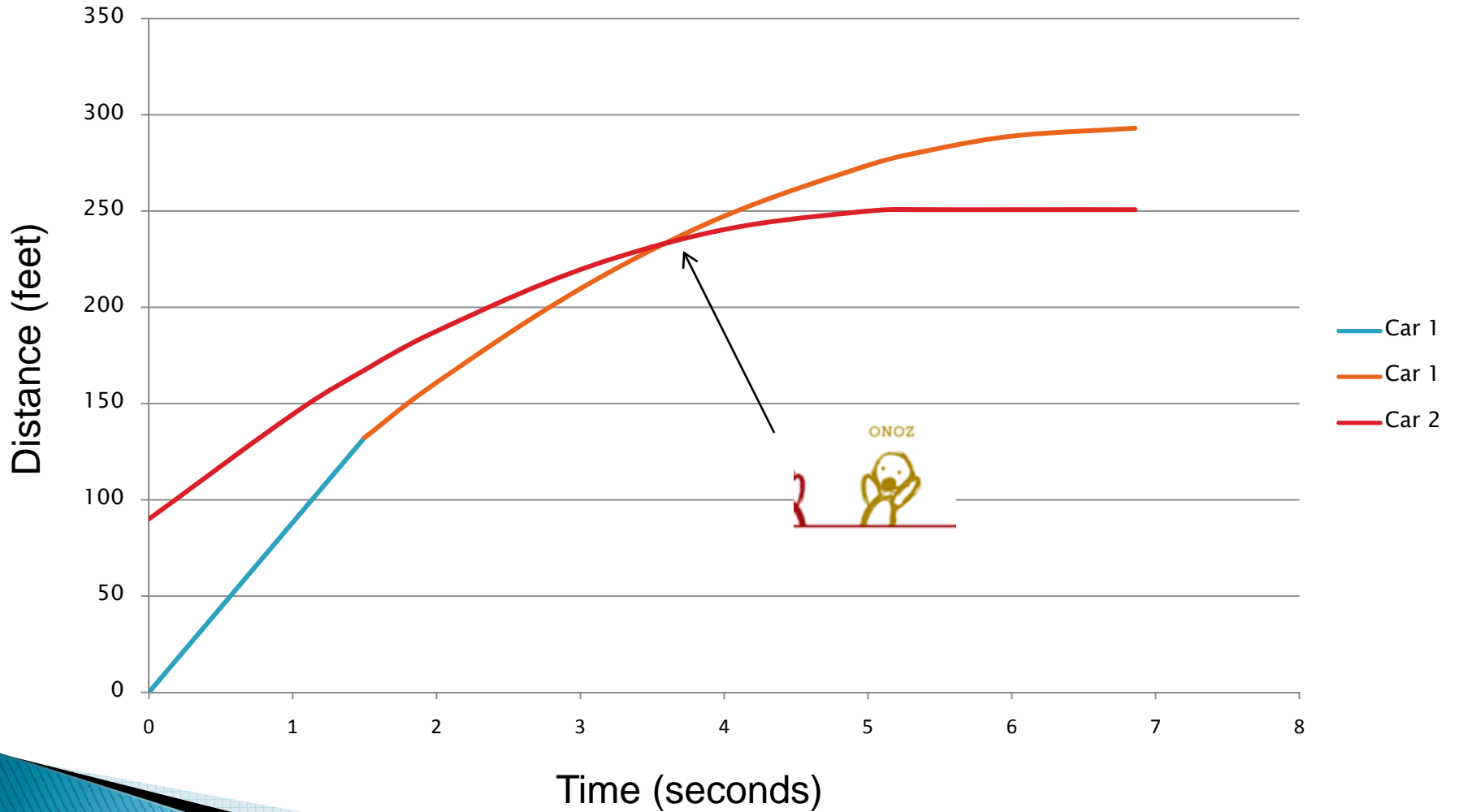
- ▶ Three scenarios
- ▶ Constant
 - Speed of 60 mph
 - Distance of 90 ft (6 car lengths)
- ▶ Reaction times
 - 0.7 s
 - 1.5 s
 - 2.5 s



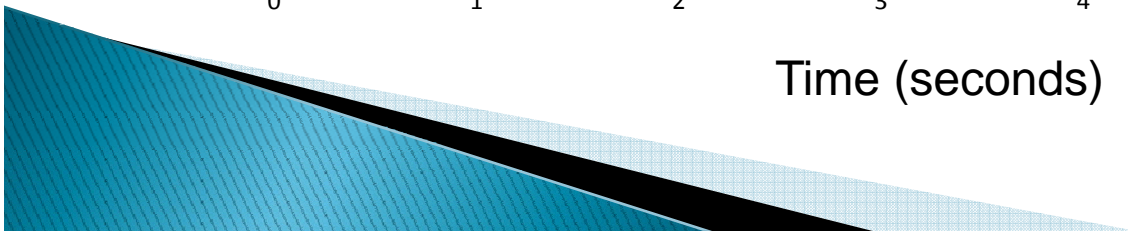
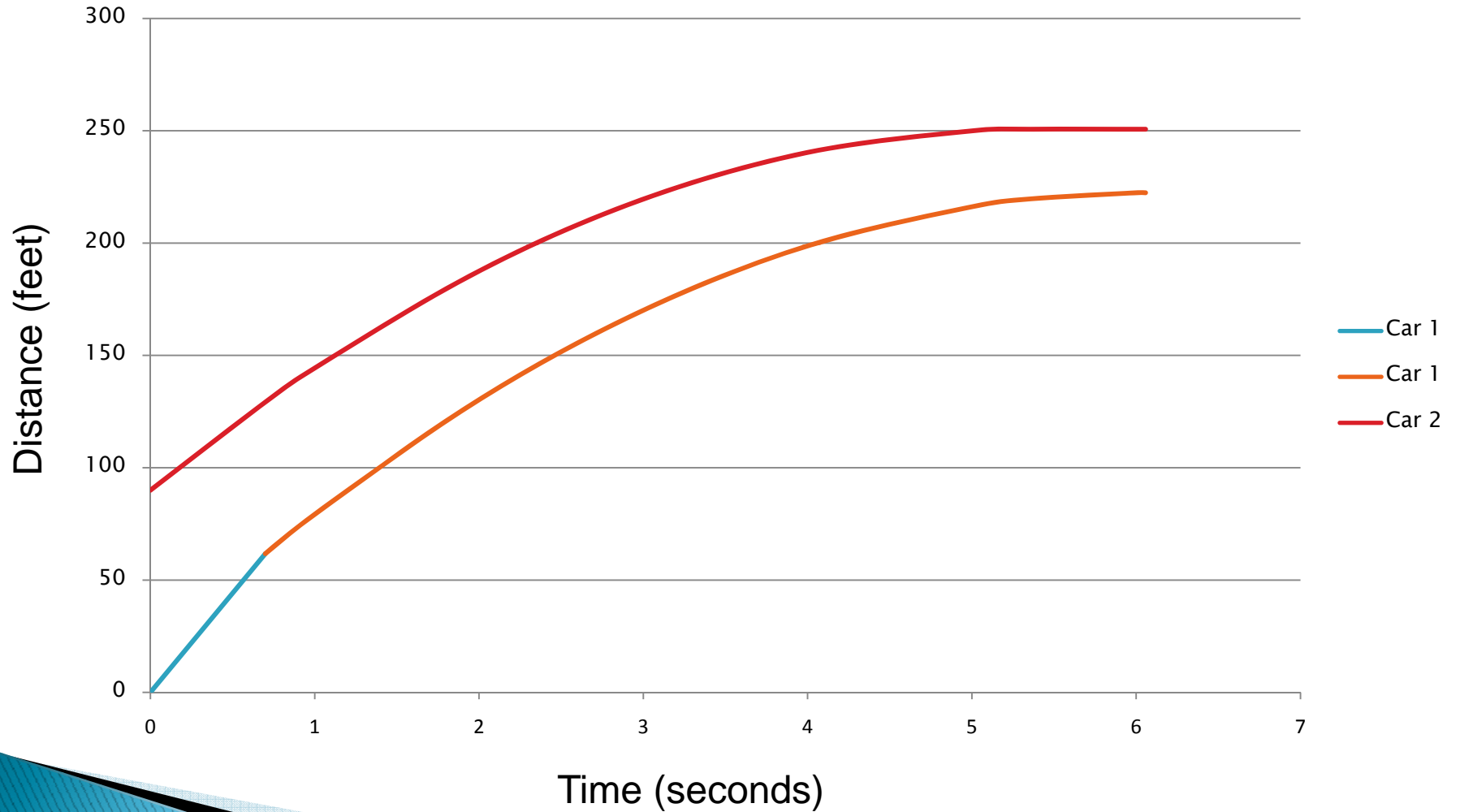
Situation #1



Situation #2

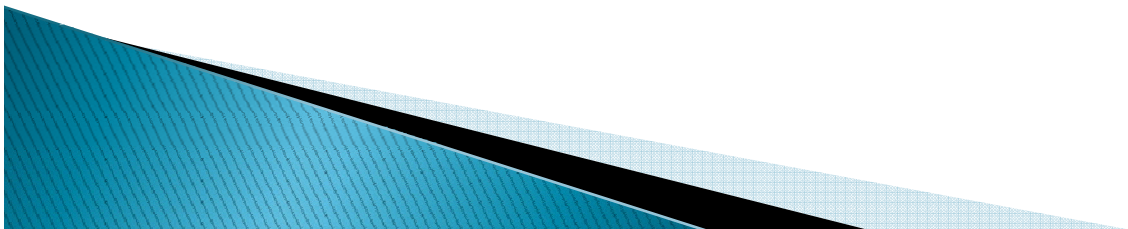


Situation #3



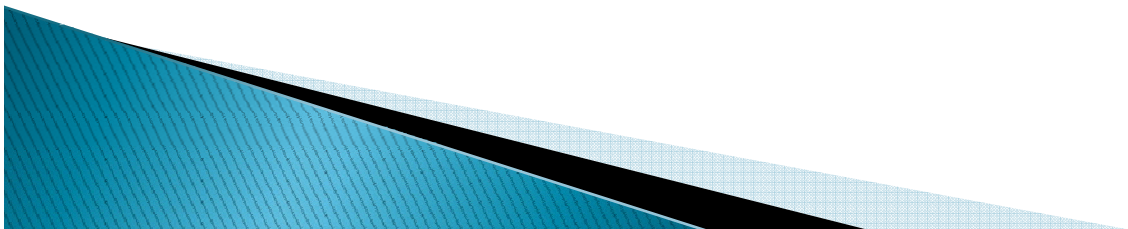
Treatments

- ▶ Consist of markings at the road or roadside.
- ▶ They are based on time.
- ▶ Treatment systems
 - Painted dots
 - Painted chevrons
 - Neon panels
 - Painted bars



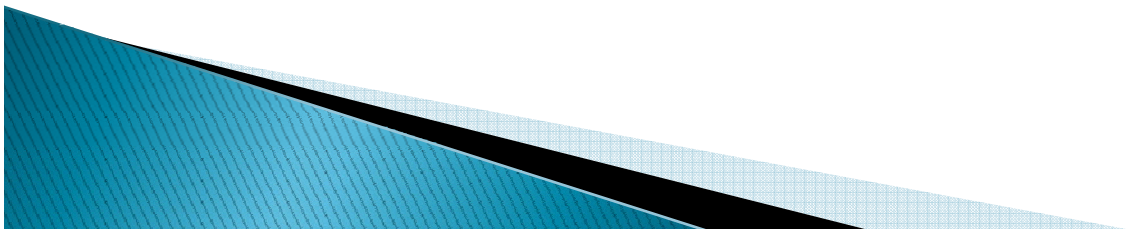
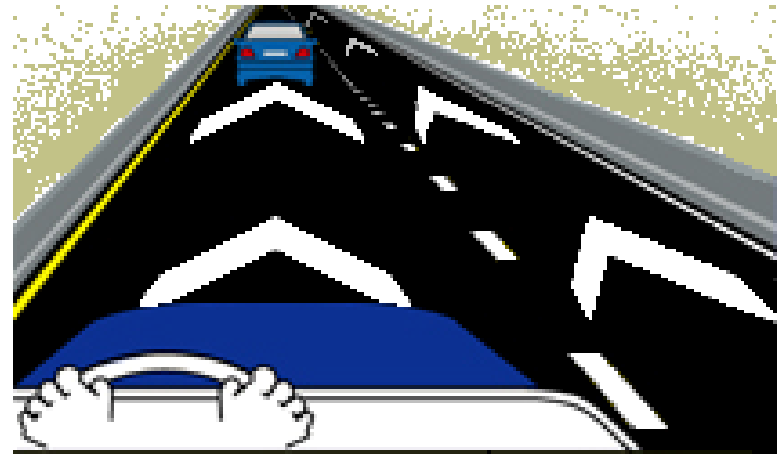
Painted dots

- ▶ Painted ovals on 3:1 ratio.
- ▶ Currently used in Minnesota, Pennsylvania & Australia.



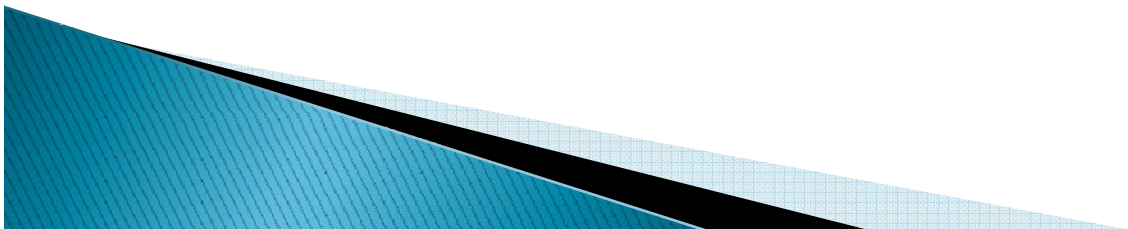
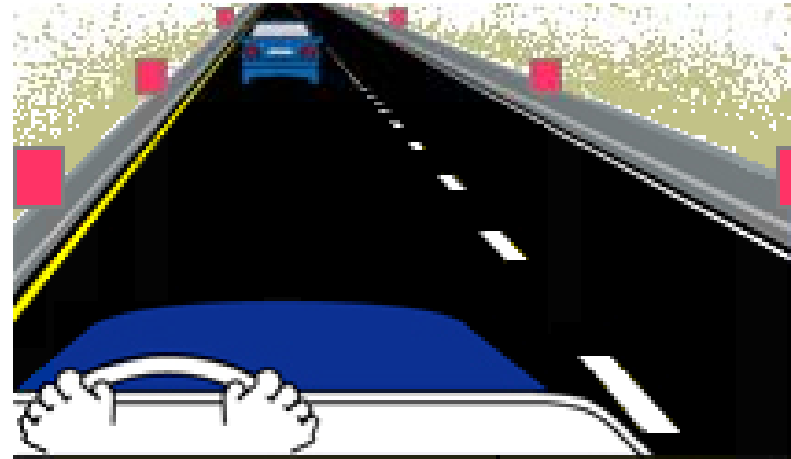
Painted chevrons

- ▶ The angle of the arrow varies with the median speed.
- ▶ Currently used in countries around Europe and Australia.



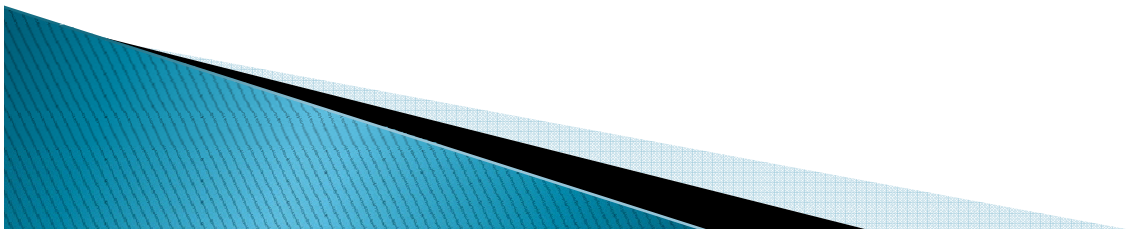
Neon panels

- ▶ Located at the roadside.
- ▶ Currently used in Maryland.



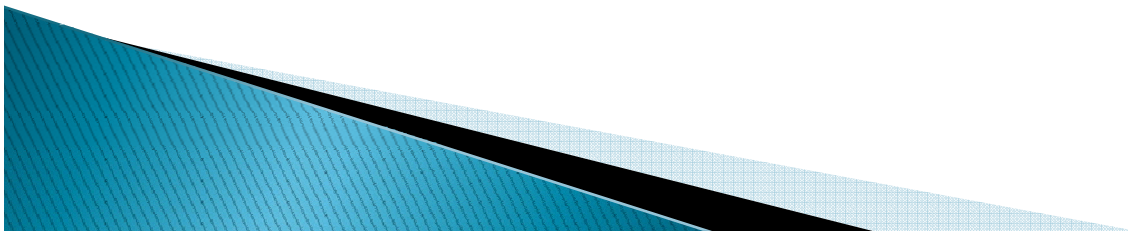
Painted bars

- ▶ Horizontal bars.
- ▶ Currently is not being used.

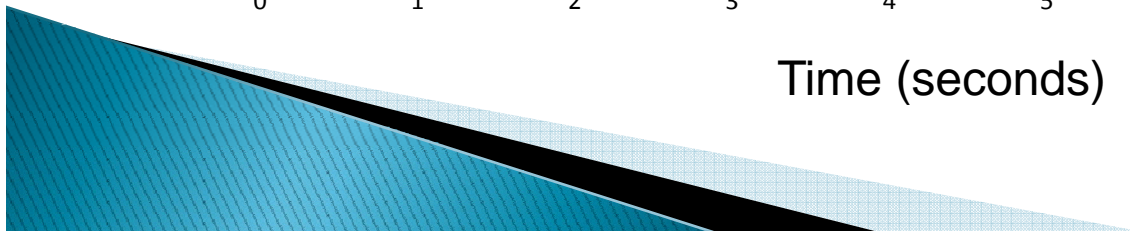
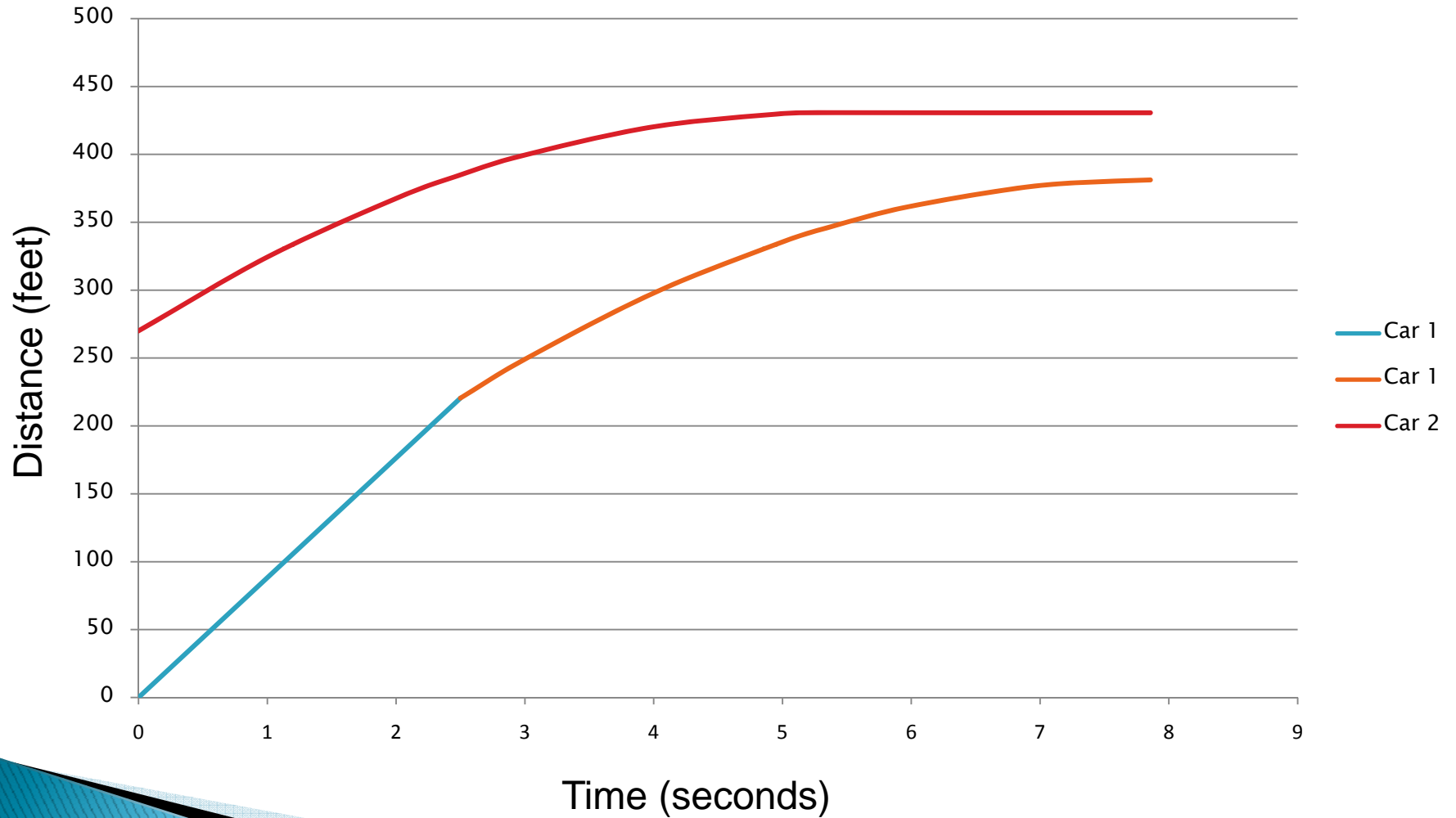


What will happen?

- ▶ Treatment system placed using a three second rule.
- ▶ Speed of 60 mph.
- ▶ Reaction time of 2.5 s.

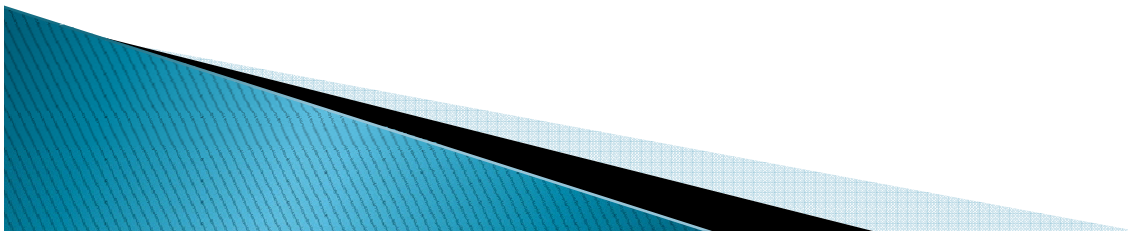


With a treatment



Survey

- ▶ Electronic survey.
- ▶ Three categories.
 - Tailgating practice
 - Vehicle headway
 - Treatment systems



Sample questions

1. Which of the following would you consider as major contributing factors to crashes? Rank the top 3.

- | | |
|---|--|
| <input type="checkbox"/> Road rage | <input type="checkbox"/> DUI |
| <input type="checkbox"/> Distraction | <input type="checkbox"/> Mechanical failures |
| <input type="checkbox"/> Tailgating/Insufficient headway | <input type="checkbox"/> Road conditions |
| <input type="checkbox"/> Running red lights | <input type="text" value="1"/> Poor weather |
| <input type="text" value="2"/> Speeding | <input type="text" value="3"/> Poor visibility |
| <input type="checkbox"/> Changing lanes without signaling | <input type="checkbox"/> Confusing road signs |
| <input type="checkbox"/> Obstruction of passing vehicles | |

Next Question

Sample questions

12. How much vehicle headway would you maintain between your car and the vehicle in front of you while driving 60 mph on highways?

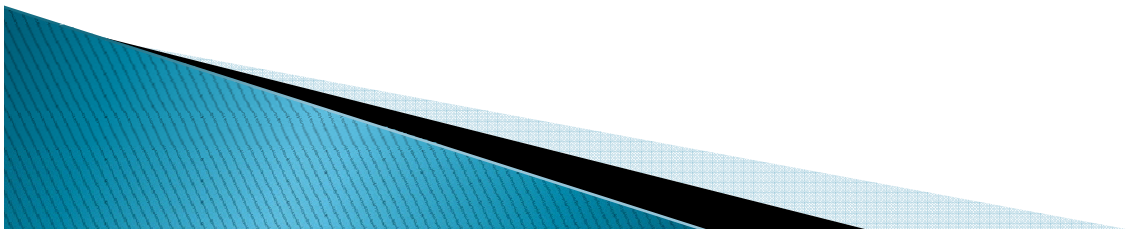
- (A) One second
- (B) Two seconds
- (C) Three seconds
- (D) More than three seconds
- (E) I don't know

Next Question

13. How much distance would you maintain between your car and the vehicle in front of you while driving 60 mph on highways?

- (A) One car length
- (B) Two car lengths
- (C) Three car lengths
- (D) Four car lengths
- (E) Five car lengths
- (F) Six car lengths
- (G) 7-10 car lengths
- (H) 11-15 car lengths
- (I) I don't know

Next Question



Sample questions

16. Which of the following would be most effective in helping you maintain a proper vehicle headway?

(A) Painted dots



(C) Neon panels



(B) Painted arrows







(D) Bars



Next Question

Sample questions

17. Which of the following signs would be easiest to understand?

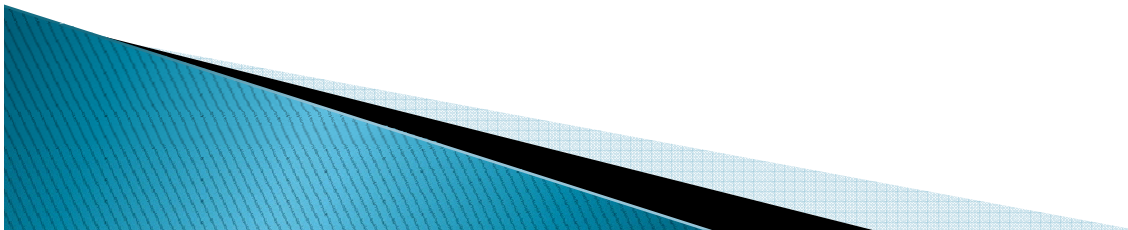
- (A) 
- (B) 
- (C) 
- (D) 

Next Question

18. Which of the following signs would be easiest to understand?

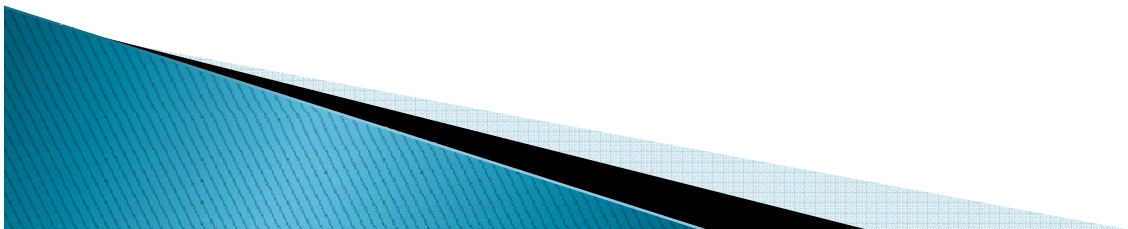
- (A) 
- (B) 
- (C) 
- (D) 

Next Question



Acknowledgements

- ▶ University of Rhode Island Transportation Center
- ▶ Rhode Island Department of Transportation
- ▶ Dwight Eisenhower Program
- ▶ Dr. Jay Wang
- ▶ Miao Song
- ▶ Dr. Alberto Figueroa



Questions?

