



PURPOSE

The purpose of this activity is to provide you with the opportunity to learn about the variability of how drivers respond to the yellow indication, including how distance and time from the intersection at the onset of yellow affects the driver's likelihood of stopping (or not).

LEARNING OBJECTIVES

- Describe the different responses of drivers to the yellow indication based on their location upstream of the intersection
- Compare field data with the theoretical basis of stopping

REQUIRED RESOURCE

- Data file: A54.xlsx.

DELIVERABLE

- Prepare a spreadsheet that includes the following information:
 - Tab 1:** Title page with activity number and title, authors, and date completed
 - Tab 2:** Raw data for stopped and not-stopped vehicles
 - Tab 3:** Statistical summaries as required in Task 1
 - Tab 4:** Plot from Task 2
 - Tab 5:** Plot as required in Task 3
 - Tab 6:** Answers to the Critical Thinking Questions

CRITICAL THINKING QUESTIONS

As you begin this activity, consider the following questions. You will come back to these questions once you have completed the activity.

1. Based on the statistical summaries that you prepared in Task 1, how are the characteristics the same or different for vehicles that stop in response to yellow and those that don't?

2. What conclusions about driver behavior (the decision to stop or not) can you make based on the plots that you prepared in Tasks 2 and 3?

INFORMATION

It is important to learn about the connections (and, sometimes, differences) between theory and how drivers actually behave in the field. In this activity, you will work with a data set from the NGSIM project that includes observations of drivers along Lankershim Blvd. in Los Angeles (described earlier in Activities #3 and #10). This data set contains 303 records of vehicles responding to the onset of the yellow indication; each record includes whether the vehicle stopped or continued through the intersection, and, at the time of yellow onset, (1) how far the vehicle was from the stop bar, (2) its speed, and (3) how long it would take to reach the stop bar at this speed and from this distance. You will see that whether drivers decide to stop or not when the yellow is displayed, even when a set of drivers are the same distance or travel time upstream of the intersection, is a probabilistic outcome. When a driver is closer to the intersection, there is a higher probability that he or she will continue through the intersection without stopping; the farther away the driver is from the intersection, the probability increases that he or she will stop in response to the yellow indication.

TASK 1

Prepare statistical summaries of both the “stopped” and “didn’t stop” data sets, including mean values of and frequency distributions for the distance and time from the intersection at the onset of yellow. Prepare a table showing the probabilities of vehicles stopping or not stopping in 50 foot “distance from the stop bar” bins.

TASK 2

Prepare a chart of “time from the stop bar” (x-axis) and “distance from the stop bar” (y-axis) for both data sets (vehicles that stop and those that don’t). Include a vertical line on the chart that represents the onset of yellow (at $t = 2.9$ seconds).

TASK 3

Compute the trajectories for two vehicles that respond to the yellow indication at $t = 2.9$ seconds. Assume that one vehicle continues to travel at 25 miles per hour through the intersection. Assume that the second vehicle, after a one second perception-reaction time, begins to decelerate at 10 feet per second per second and comes to a stop at the stop line. Add these two lines to the chart that you prepared in Task 2.