

Introduction

- Distraction is often associated with reductions in driving speed
- This is usually based on global measures of performance, such as course completion time or mean speed (Oviedo-Trespalacios et al., 2017)
- Distraction is defined as any event or behavior that drew cognitive, visual, and physical attention away from the primary task, which was driving in a simulator.

Hypothesis

- Distraction leads to large variation in speed control relative to the control road segments
- This includes both speed-ups and slow-downs

Methods

Participants

- N = 17 (6 males)
- 18-43 years of age ($M=24.05$, $SD = 6.83$)
- 0.5-27 years of driving experience ($M=6.6$, $SD = 6.1$)

Requirements

- Minimum 20/20 acuity
- Normal color vision
- Right-handed
- Valid U.S. drivers license

Materials

- STISIM3 Driving Simulator
- Logitech G29 steering set
- iPhone XS

Methods (cont.)

Driving Task

- Practice course - 4.7 miles
- Full drive - 16.5 miles (Figure 1).
- Told to follow all posted signage and stay in the right-hand lane.

Secondary Task

During 6 pre-defined sections of .75 miles, participants:

1. Received a text message with a two-digit subtraction equation (ex. $54 - 16$)
2. Responded to the message via text
3. Repeated until the end of each section

Questionnaire

At the end of the study, participants filled out a demographics survey regarding:

- Age
- Gender
- Years licensed
- Annual driving amount
- Annual miles driven
- Driving environment (i.e., city, rural, etc.)



Figure 2: Example of simulated driving scene

Results

The standard deviation of the longitudinal velocity during each participant's control road segment (where they drove and did not text) was calculated. Slow-down or speed-up events were defined as changes in velocity exceeding $2\pm$ this value (see Figure 2). This resulted in:

- 91 Speed-ups (39.9%)
- 140 Slow-downs (60.1%) (Figure 3)
- Average speed-ups: +6.1 mph for 10.9 seconds
- Average slow-downs: -5.9 mph for 13.1 seconds
- Maximum speed-ups: +7.4 mph
- Minimum slow-downs: -7.7 mph

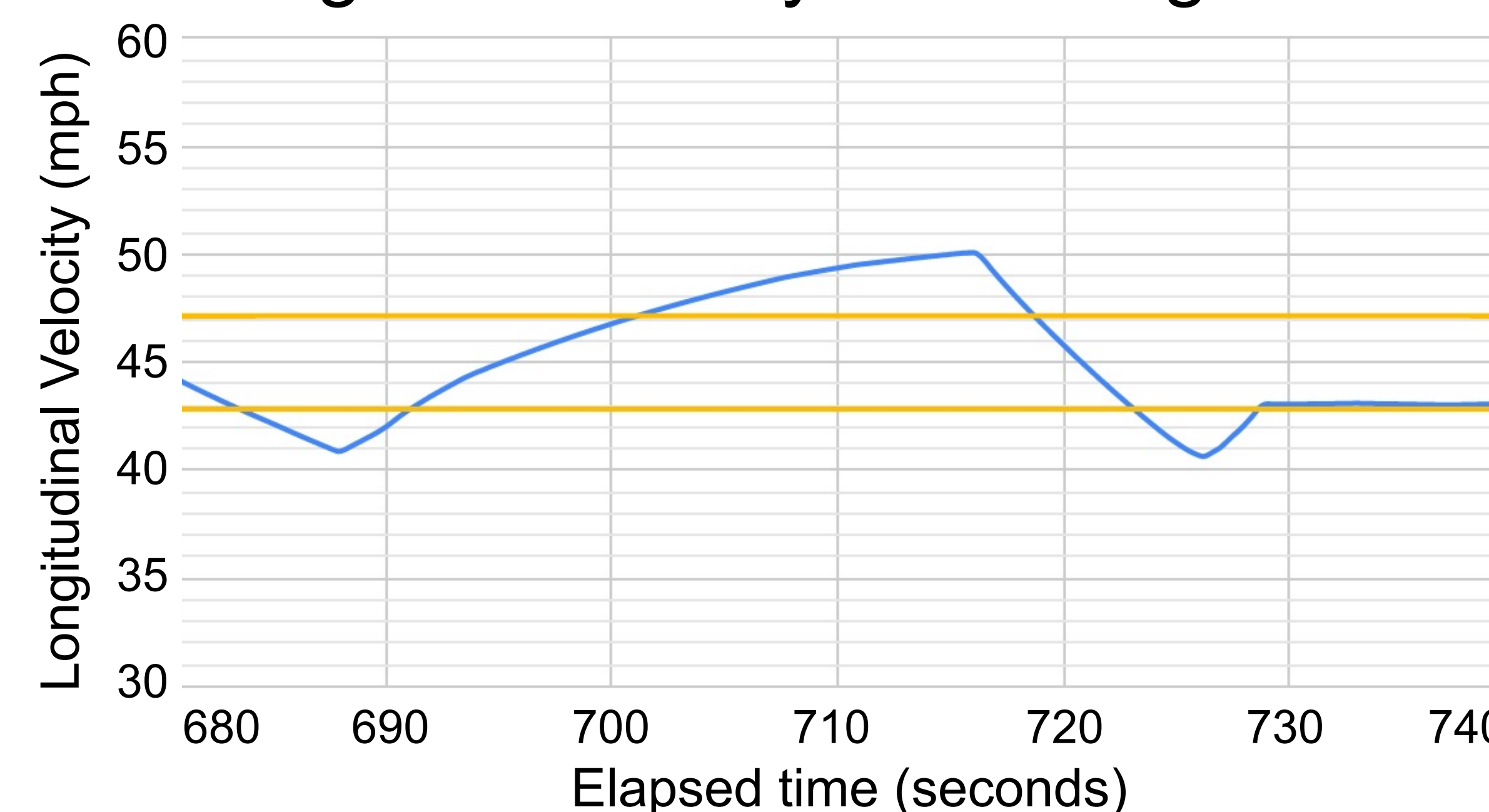


Figure 2: Two examples of longitudinal velocity data. The yellow lines indicate the upper and lower bounds of the participant's speed during the control section. The blue line indicates speed variation while texting.

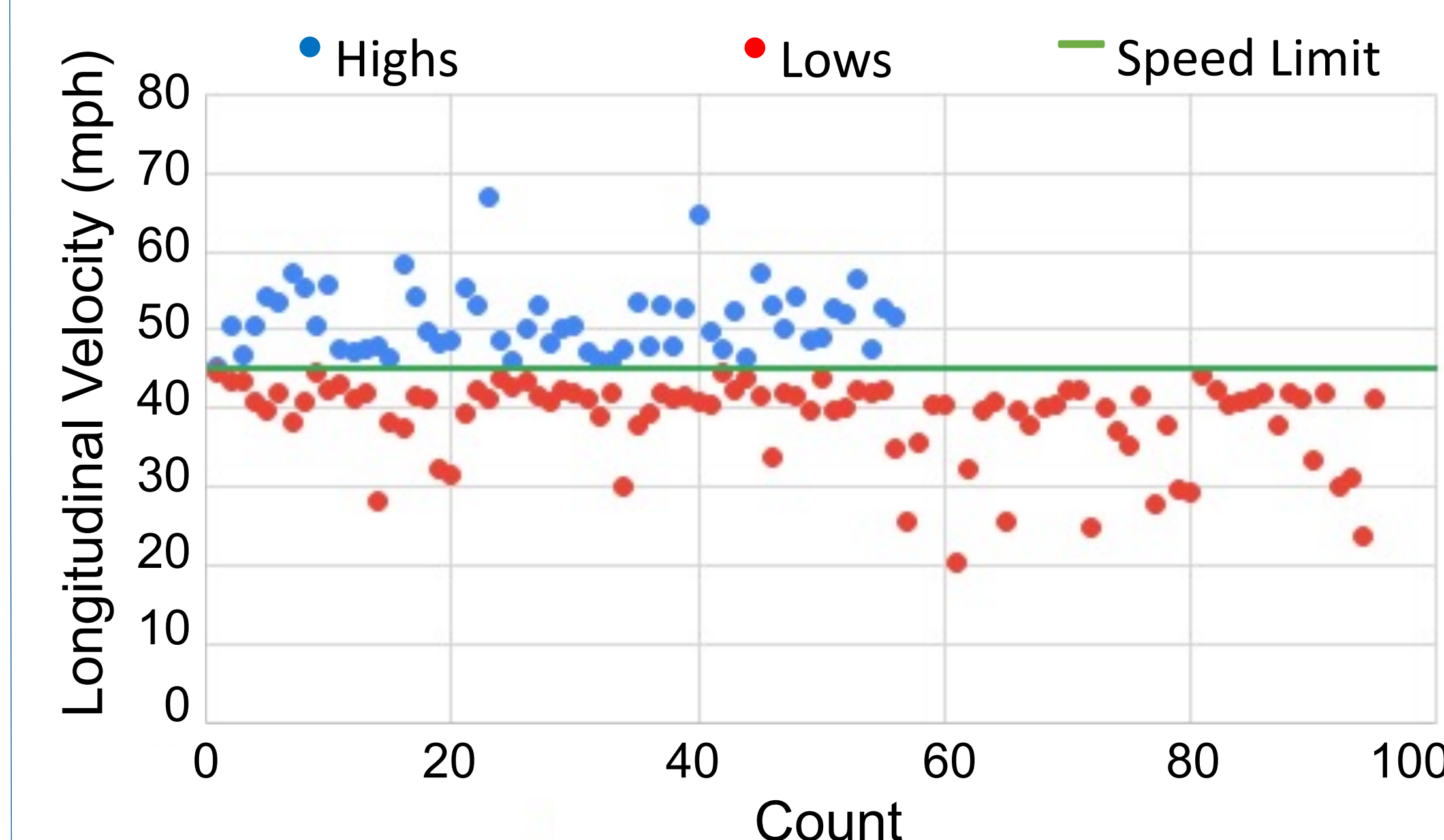


Figure 3: A scatterplot containing some instances of speeding up (in blue) or slowing down (in red). The horizontal green line indicates the speed limit.

Discussion

Our results do not support the current conclusions found in the literature. We found that:

- There were many instances of speed increases under distraction
- Not all speed-up events were preceded by a slow-down
- Participant speed oscillated above and below the cutoff multiple times within single data collection events
- Oscillation occurred when the magnitude did not exceed the cutoff

Overall, there was a wide range of variation in driver speed control while distracted. Further testing must be done to better understand these effects.

References

- Oviedo-Trespalacios, O., Haque, M., King, M., & Washington, S. (2017). Self-regulation of driving speed among distracted drivers: An application of driver behavioral adaptation theory. *Traffic Injury Prevention, 18*(6), 599-605.