

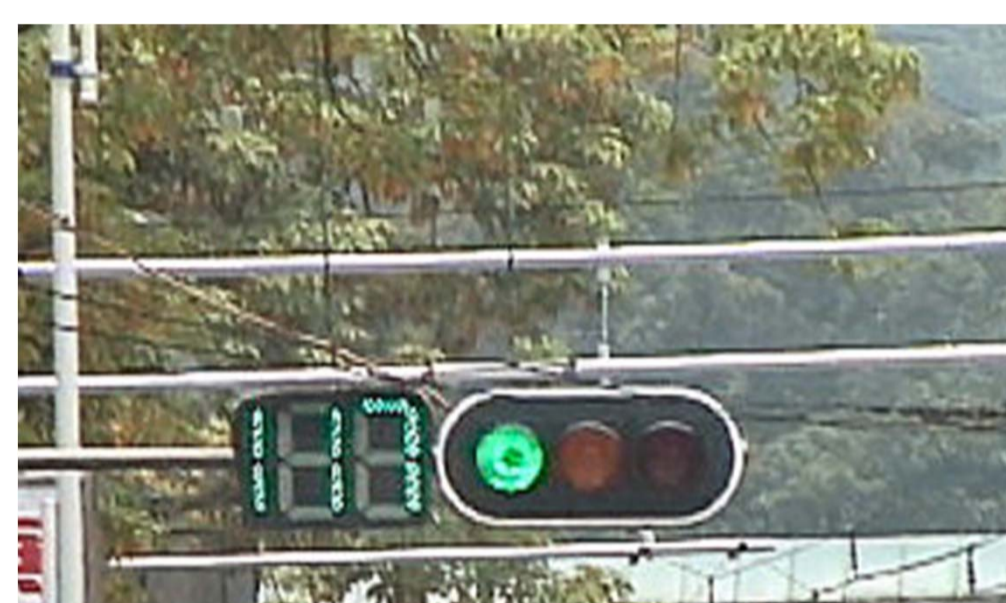
This study proposes the driver's judgment assistance system at a signalized intersection ahead using the signal information. The proposed system informs a driver visually of the distance which the vehicle can forward by maintaining the present velocity until turning to the red signal. If the distance between the intersection and the vehicle is longer than the indicated distance, the system also indicates a stopping distance by assuming the ordinary deceleration. The driving simulator experiments are conducted to evaluate the proposed system. The assistance system encourages the earlier deceleration before turning to the amber signal and prevents the emergency braking behavior or the risky passage through the intersection.

Introduction

Traffic accident situations in Japan in 2015

Driver assistance at signalized intersection

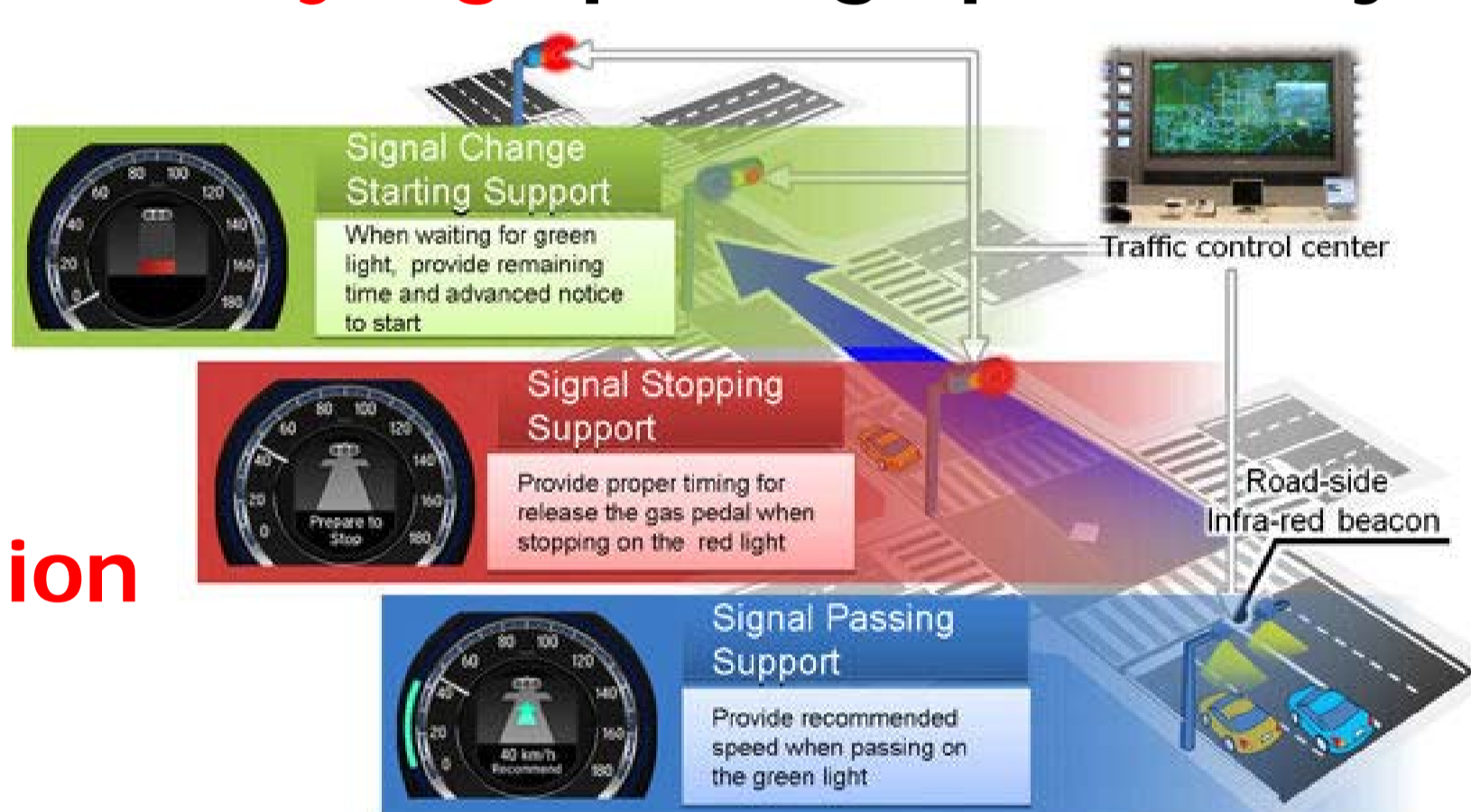
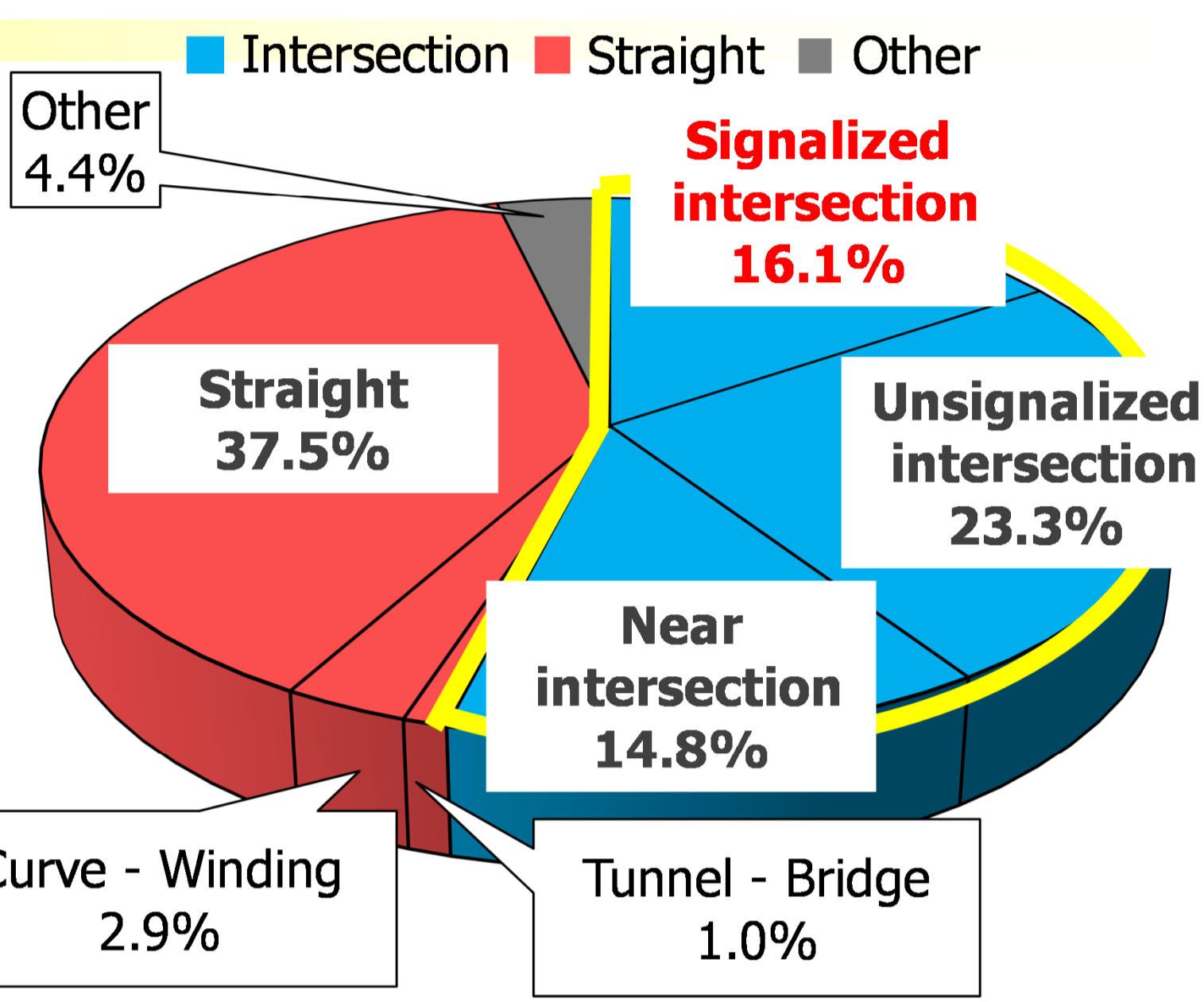
Countdown timer



=> **Difficult to judge** passage possibility

Driving support system utilizing signal information

=> Onboard monitor may cause **driver's distraction**



In this study...

Proposing driver assistance system which indicates passage possibility **on road ahead** virtually

Evaluation Indices

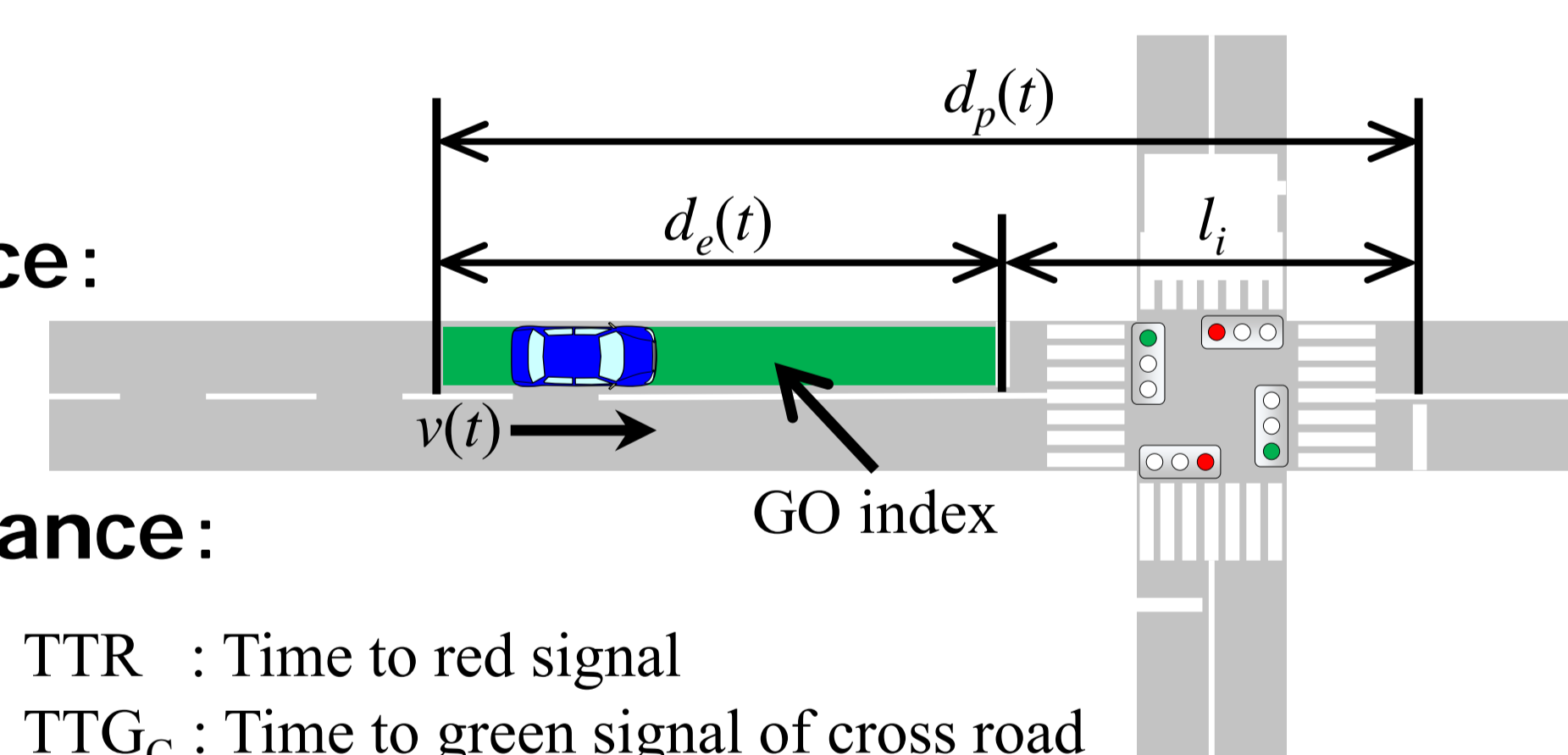
GO index

➢ Entry possible distance:

$$d_e(t) = v(t) \times TTR$$

➢ Passage possible distance:

$$d_p(t) = v(t) \times TTG_C$$

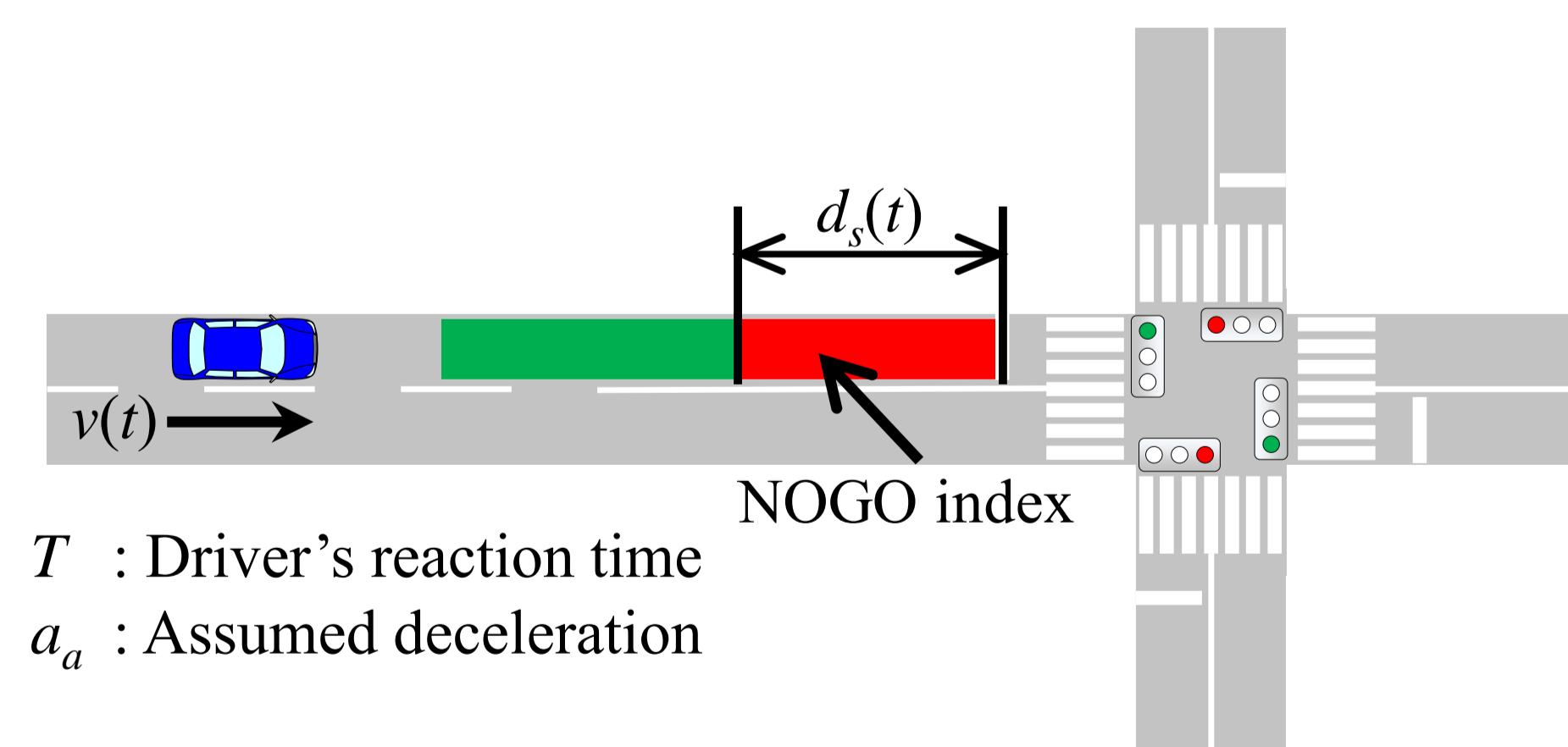


TTR : Time to red signal
TTG_C : Time to green signal of cross road

NOGO index

➢ Stopping distance:

$$d_s(t) = v(t) \cdot T + \frac{v^2(t)}{2(-a_a)}$$



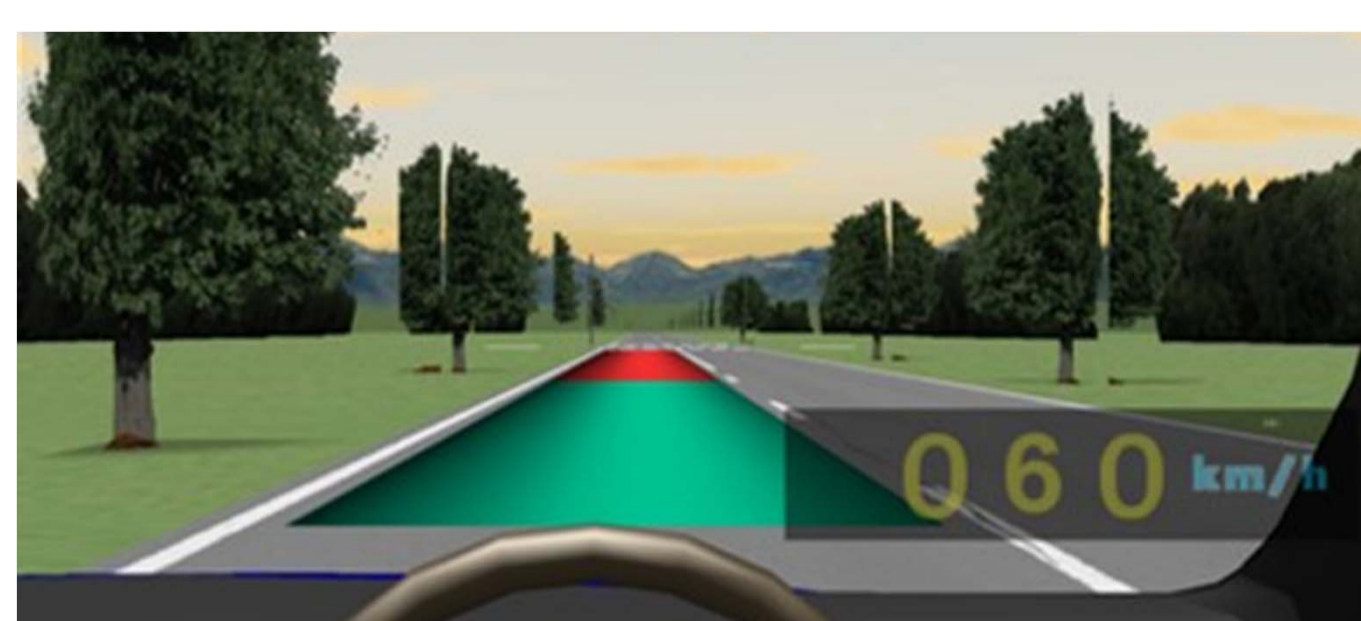
T : Driver's reaction time
a_a : Assumed deceleration

Driving Simulator Experiments

Fixed-base driving simulator



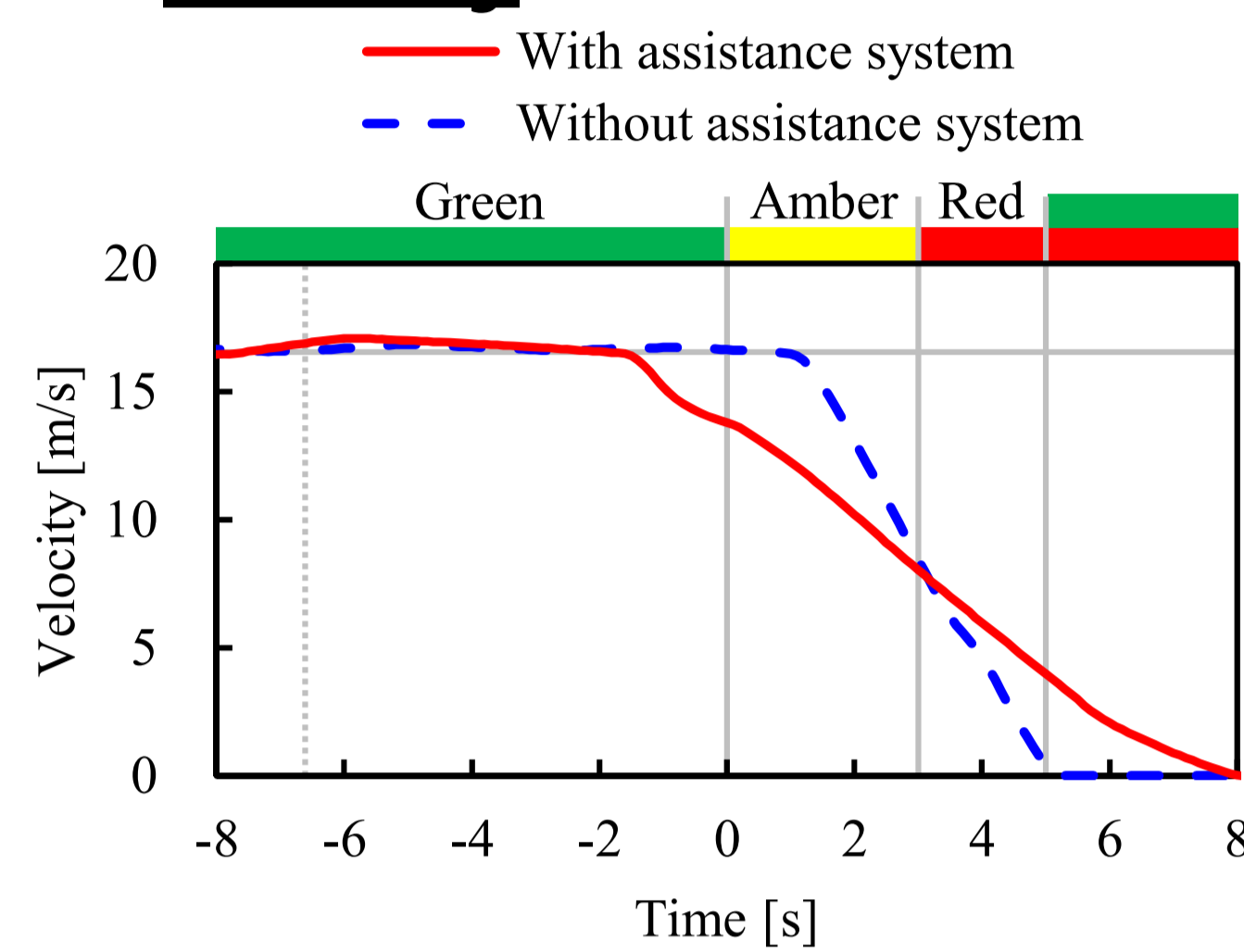
Indication image of GO/NOGO indices



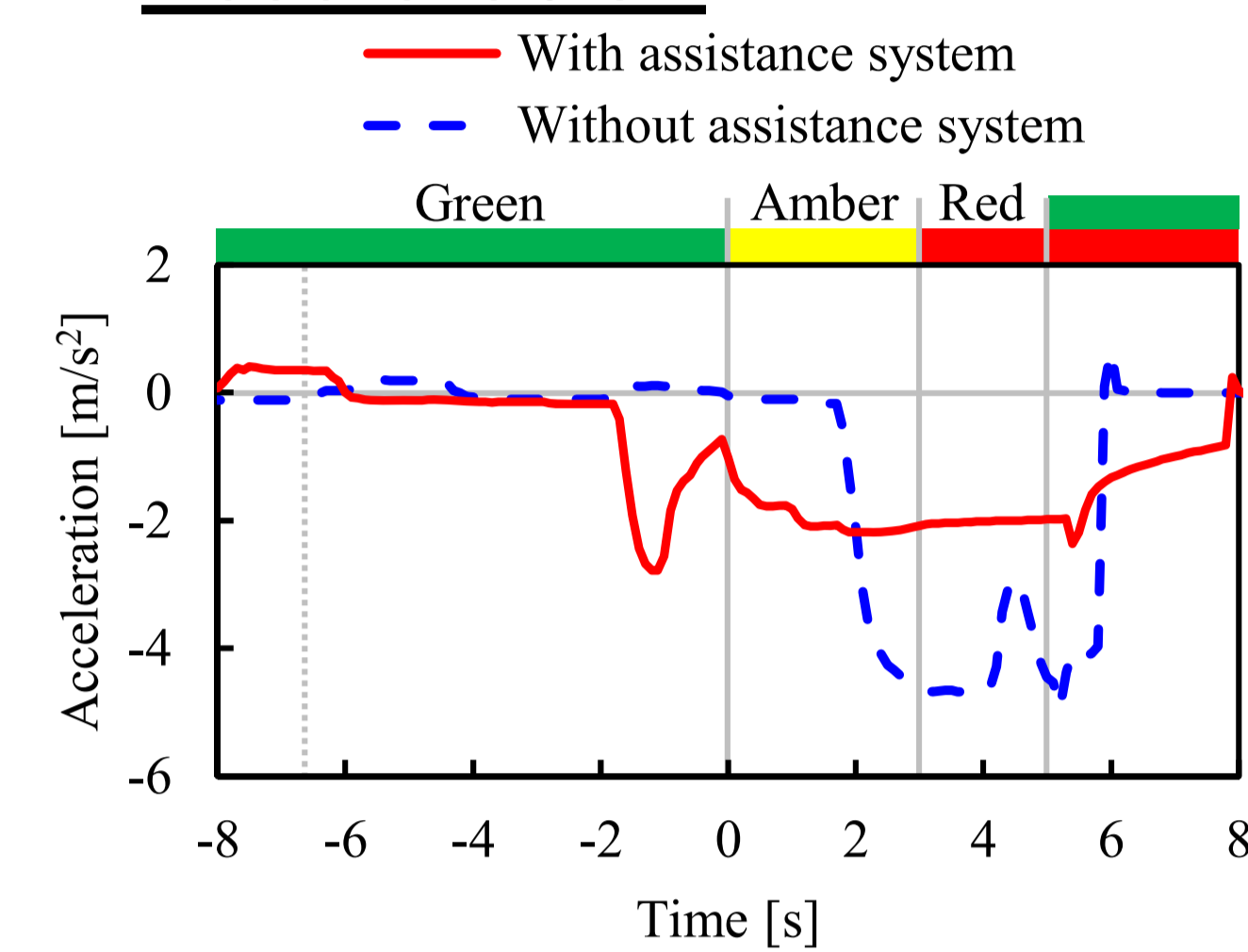
Participants: Seven males (20's)

Experimental Results

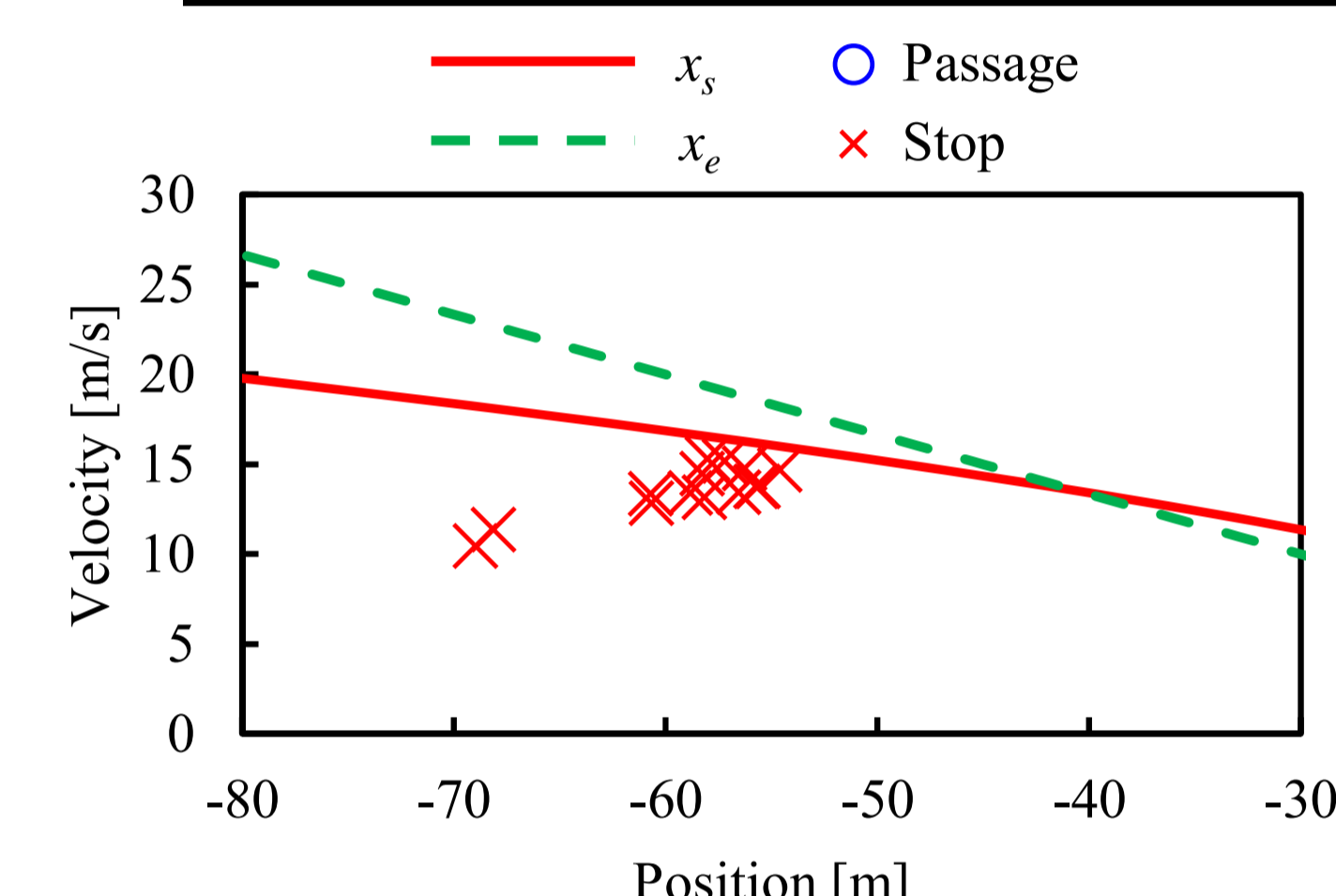
Velocity



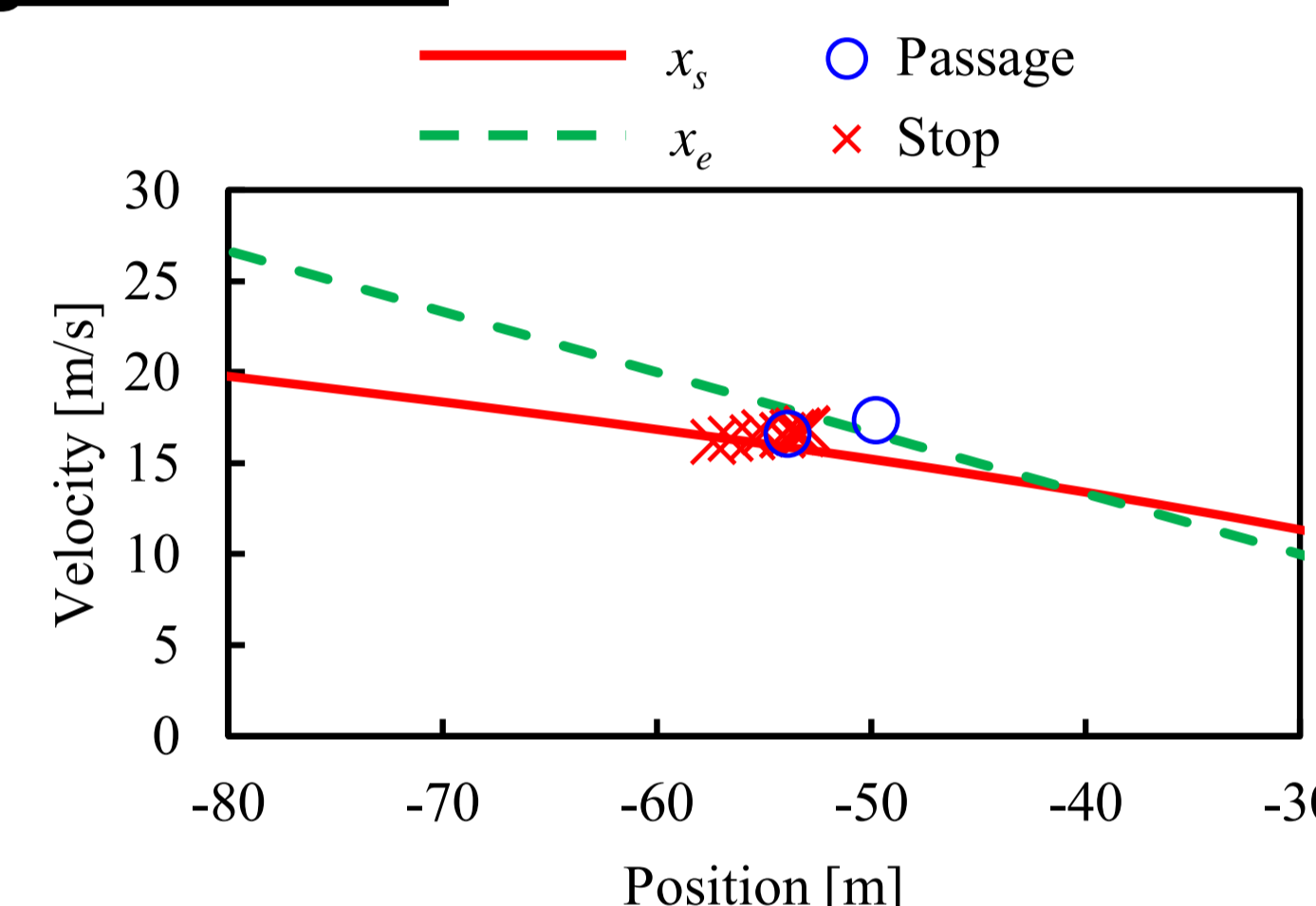
Acceleration



Vehicle states at amber signal onset



With assistance system



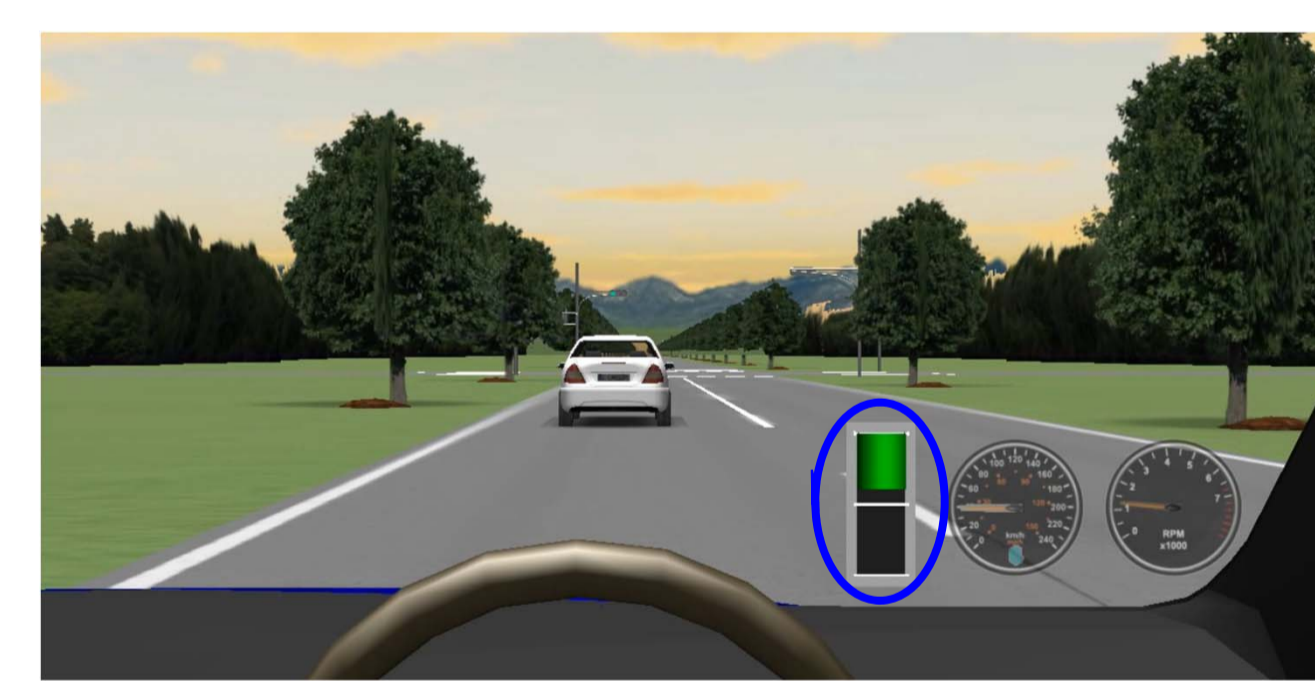
Without assistance system

Effects of Indication Method

Comparison between on-road and onboard indication



On-road indication

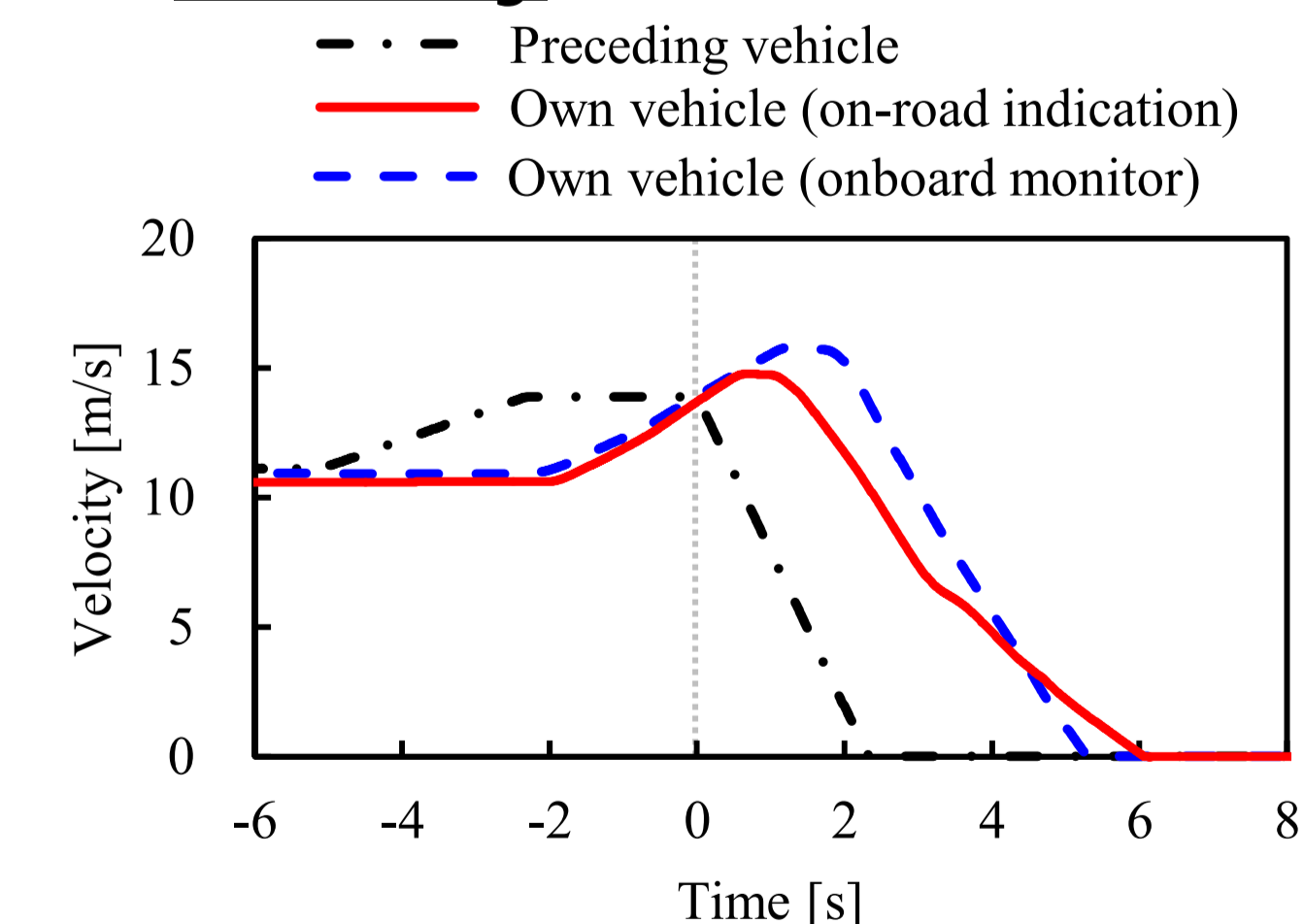


Onboard indication

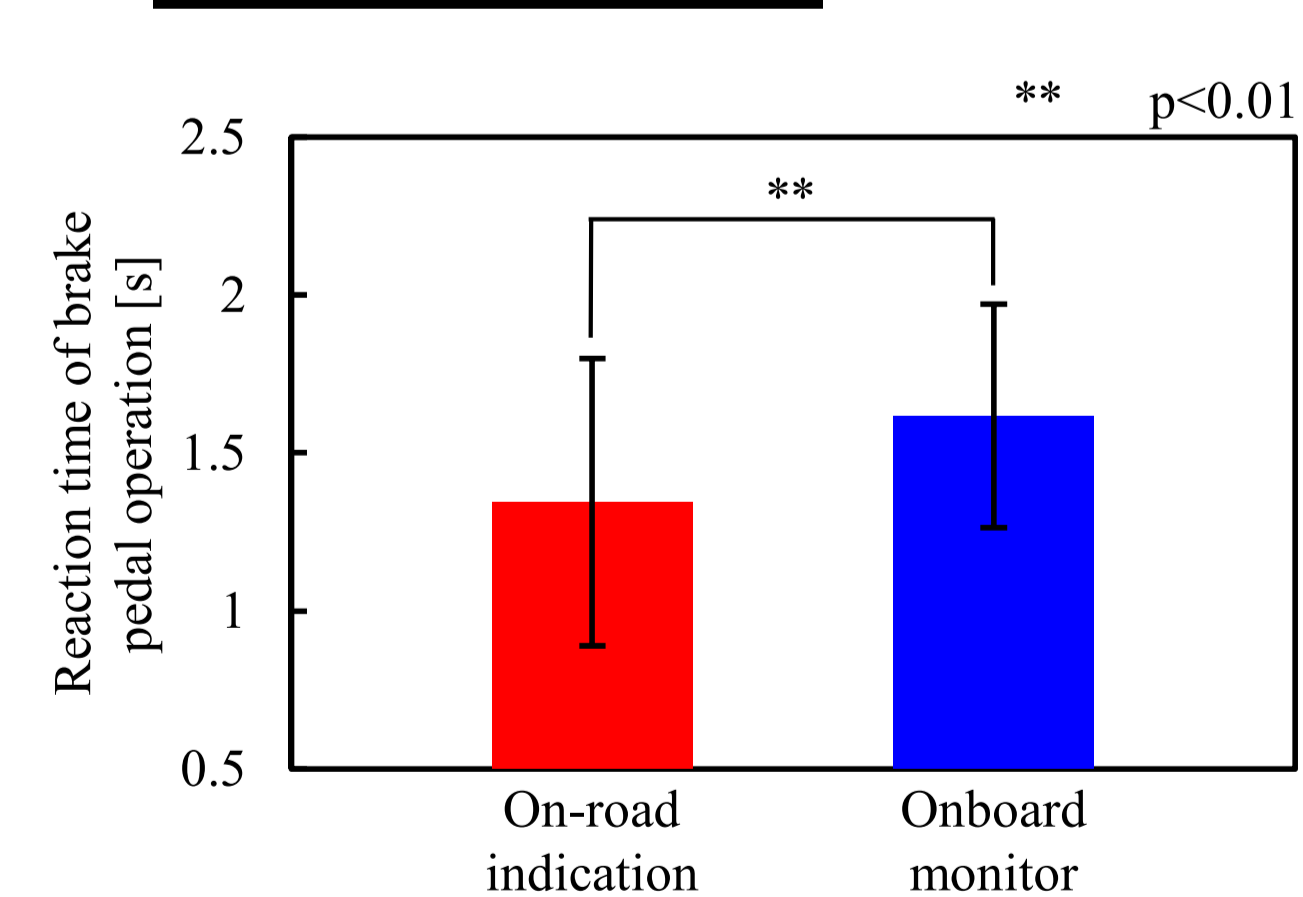
Drivers' reaction to emergency deceleration

Experimental Results

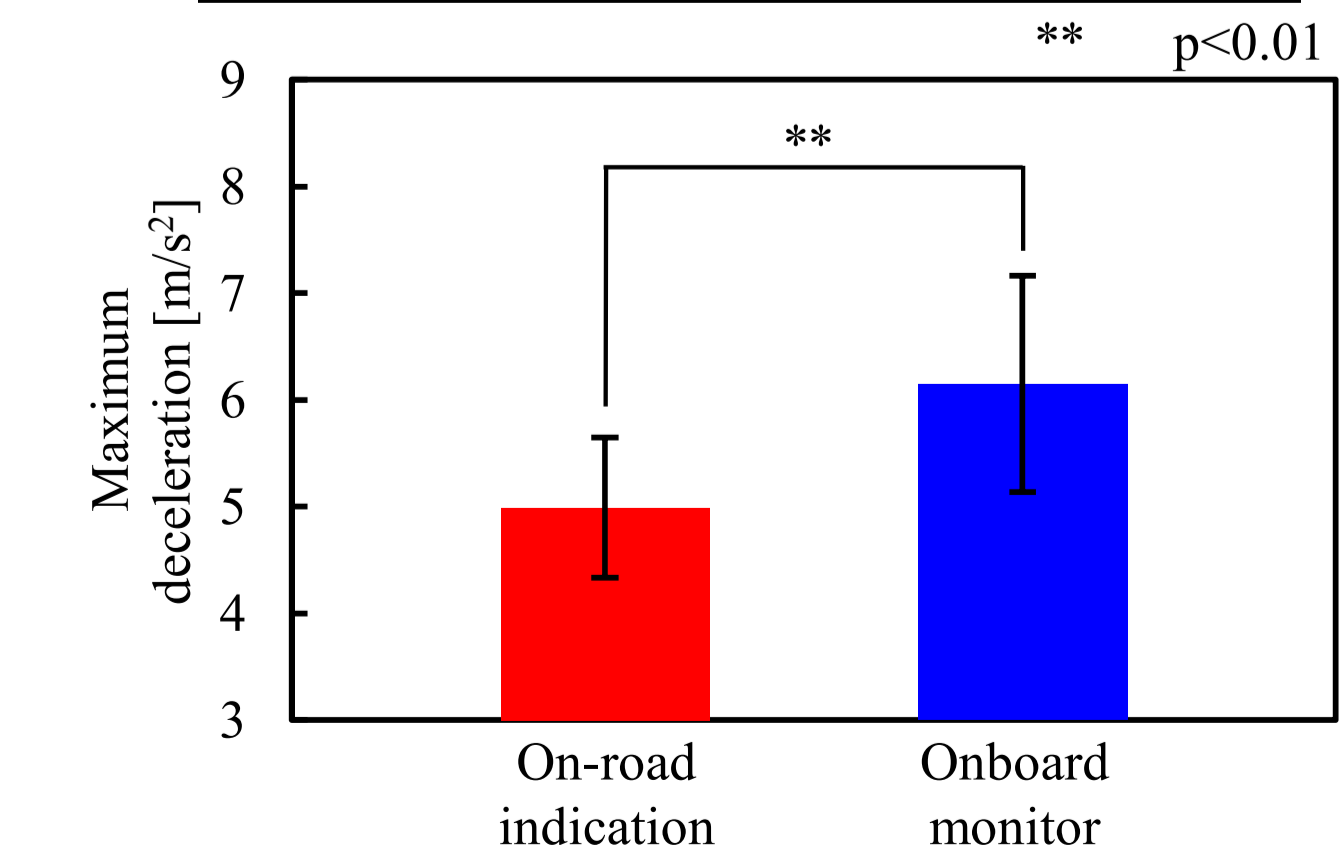
Velocity



Reaction time



Maximum deceleration



Minimum TTC

