Pedestrian Kinematics Assumptions
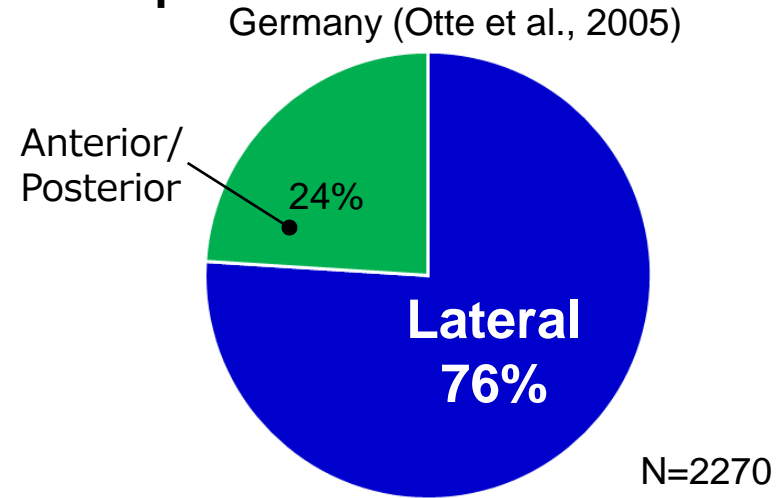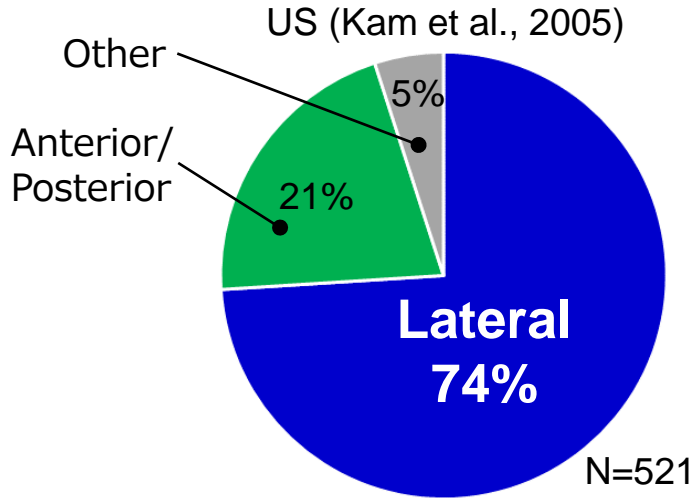
Literature review of analysis of in-depth pedestrian accident data

Pedestrian orientation at impact

US (Kam et al., 2005)

Other — 5%

Anterior/Posterior — 21%

Lateral 74%

N=521

Germany (Otte et al., 2005)

Anterior/Posterior — 24%

Lateral 76%

N=2270

Pedestrian motion prior to impact

US (Chidester et al., 2001)

Other — 3%

Running — 38%

Walking/Stationary 59%

N=552

UK (Lenard et al., 2011)

Running — 35%

Walking 65%

N=175
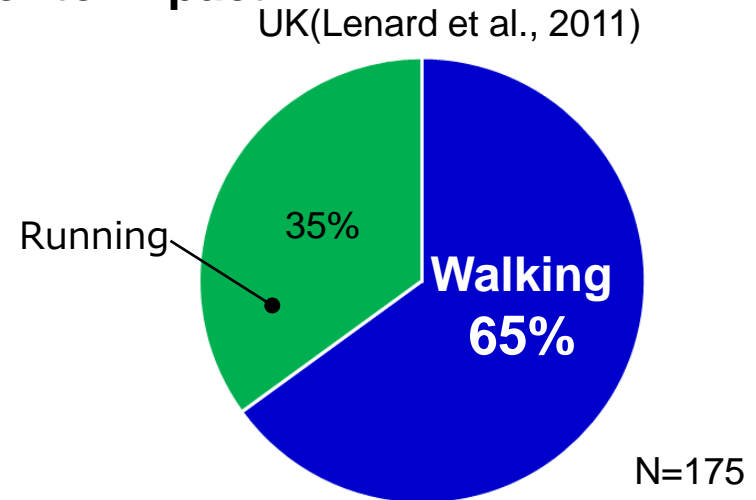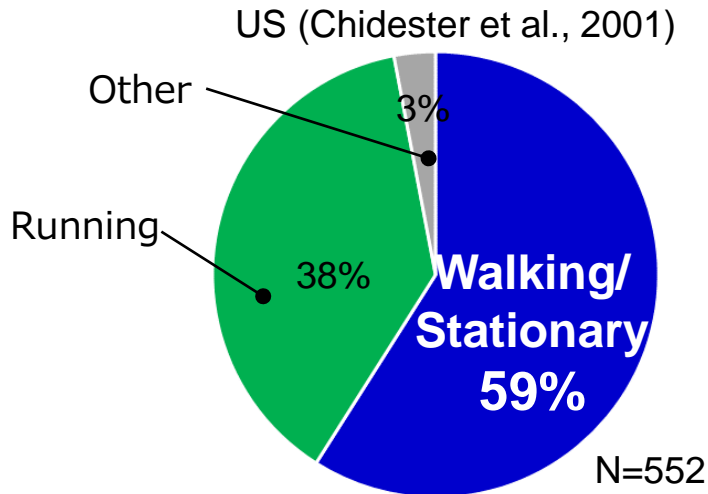
A walking pedestrian hit laterally by a vehicle is representative(majority) accident scenario in real world
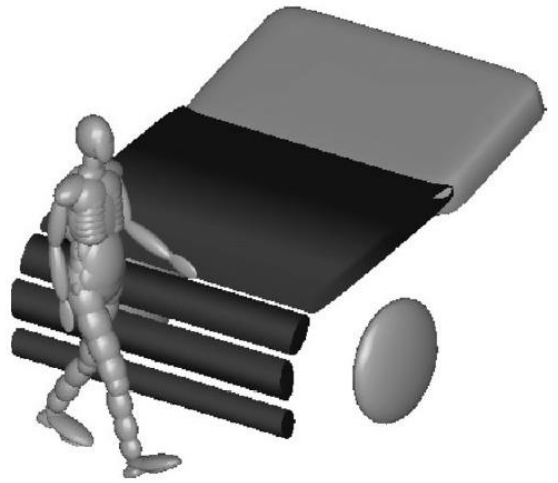
Comments on pedestrian kinematics assumptions in the discussion of the detection area

Japan's comment:

- At the last IWG meeting, Germany presented example cases showing that impact point of the head in lateral direction of the vehicle wasn't same as that of the leg.

- However, according to the analysis results of in-depth pedestrian accident data, a stationary pedestrian laterally hit by a vehicle assumed in the current GTR9 can be regarded as representative accident scenario, meaning that assumed kinematics in the current GTR9 represents real world accident.

- Japan thinks that the assumed kinematics in the GTR9 should be same.

- Therefore, Japan proposes that the pedestrian kinematics assumption in the discussion of the detection area should be same as that in the current GTR9.

- If IWG doesn't use representative(majority) scenario to DPPS, IWG needs to reconsider assumed accident scenario in the current GTR9.
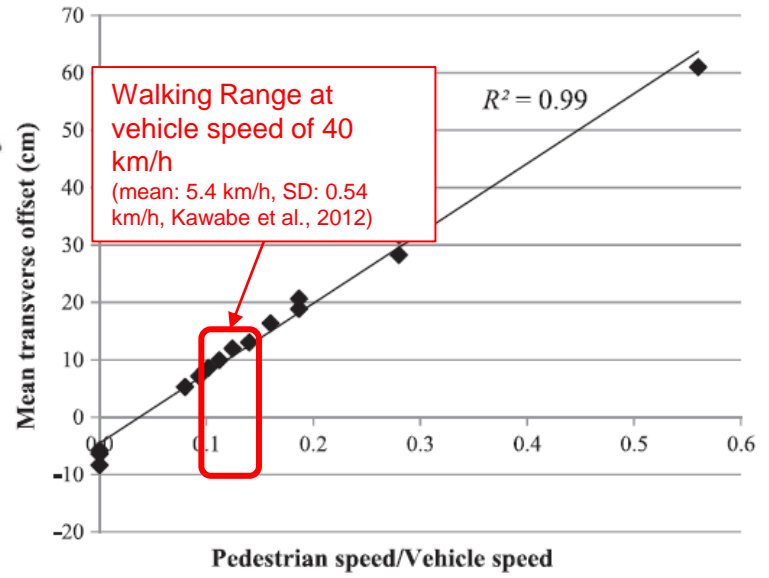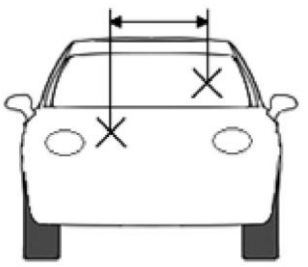
Elliott et al., 2012

Simulation setup

Transverse offset

Walking Range at vehicle speed of 40 km/h
(mean: 5.4 km/h, SD: 0.54 km/h, Kawabe et al., 2012)

$R^2 = 0.99$

Mean transverse offset (cm)

Pedestrian speed/Vehicle speed

Vehicle Speed: 5 to 17.5 (m/s)
Pedestrian Speed 0 to 2.8 (m/s)

- **Lateral offset of the head impact point relative to the leg impact point is approximately 100mm at average walking speed**
- **This lateral offset is similar to the test and simulation result presented from JASIC (IWG-DPPS-10-04)**

Pedestrian: 54YO male,
Severly injured (MAIS2)
Pedestrian crossing the street (red light),
Lateral collision with M1 (green light)
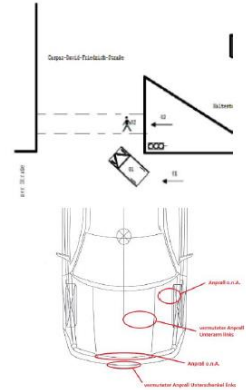
Passenger car:
Collision speed 29km/h

Low speed collision
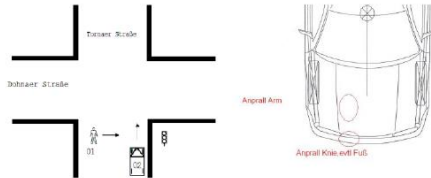
Pedestrian: 35YO male,
MAIS2
Pedestrian crossing the street (green light),
M1 turning w/ green light, overlooking way of right

Passenger car:
Collision speed 22km/h

Low speed and not lateral collision

Accident cases with large lateral offset between leg and head impact point does not seem representative accident scenario

Thank you!