Cerema

# Main hazards for pedestrians in tramway design

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- Review of the literature: why did we focus on pedestrian safety?
- Method ans data
- The results:
  - The influence of tramways in pedestrian accidents
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# Specific accidents between tramways and pedestrian

- Problems when pedestrians cross the streets with tramways:
  - Multiplication of the kind of lanes
  - Multiplication of traffic directions
  - The increase in distance of crossing

- Concentration of pedestrians accidents around tramway station
  - With tramways
  - When pedestrians run to get on a tram and get injured by other motorised vehicles

# Method

- Analysing all pedestrian accidents that occur in streets with tram lanes thanks to police accident reports
- Identifying the kind of influence of tramways :
  - (A) Direct involvement,
  - (B) Indirect involvement,
  - (C) No involvement
- Deducing main hazards for pedestrians

# Data

| | Inhabitants of the urban area | Length of the tram lines | Number of stations (no double counting) |
|---|---|---|---|
| Lines A and B in Bordeaux | 740,000 residents | 35.8 km | 71 |
| Lines 1 and 2 in Montpellier | 435,000 residents | 33.8 km | 55 |
| Line in Rouen | 495,000 residents | 15.2 km | 31, including 5 underground with no interface with pedestrians |
| Lines D and E in Strasbourg | 475,000 residents | 18.8 km | 37 |

# The influence of tramways in pedestrian accidents

- 59 % of pedestrian accidents are linked to tramways

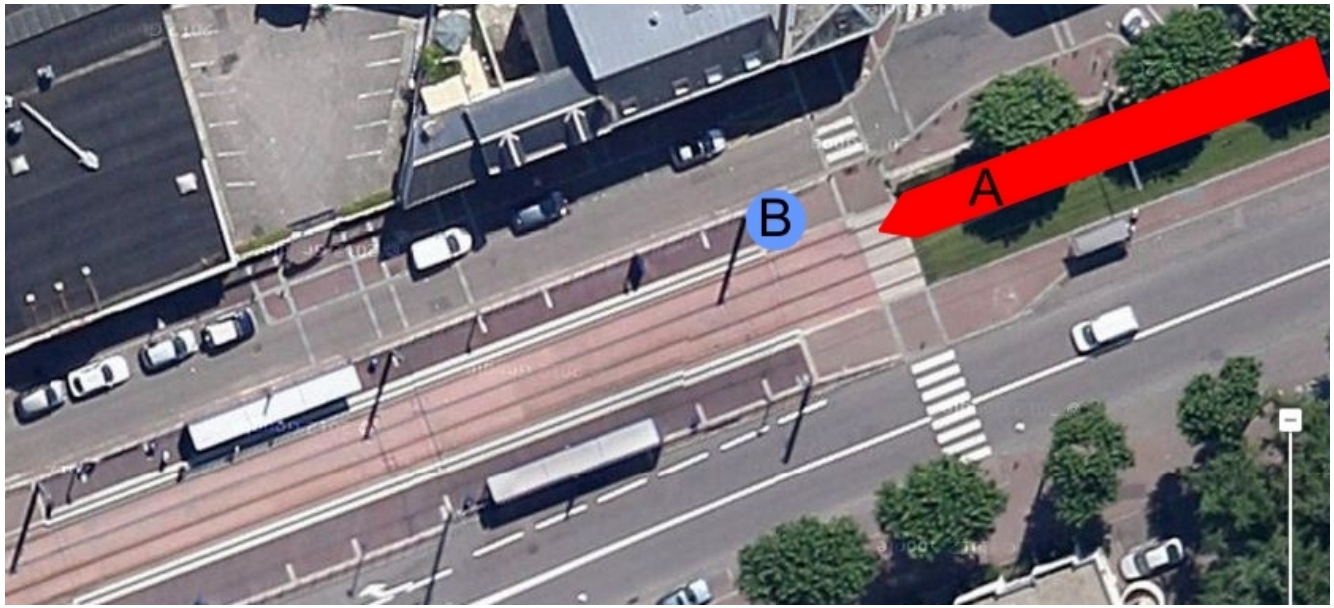
| Streetcar involvements in pedestrian accidents | Number of cases |
|---|---|
| (A) Direct involvement | 58 |
| (B) Indirect involvement | 47 |
| (C) No streetcar involvement | 73 |
| (D) Undetermined (not enough information) | 12 |
| Total | 190 |

# Main characteristics of pedestrians involved in tramway-influenced accidents (105)

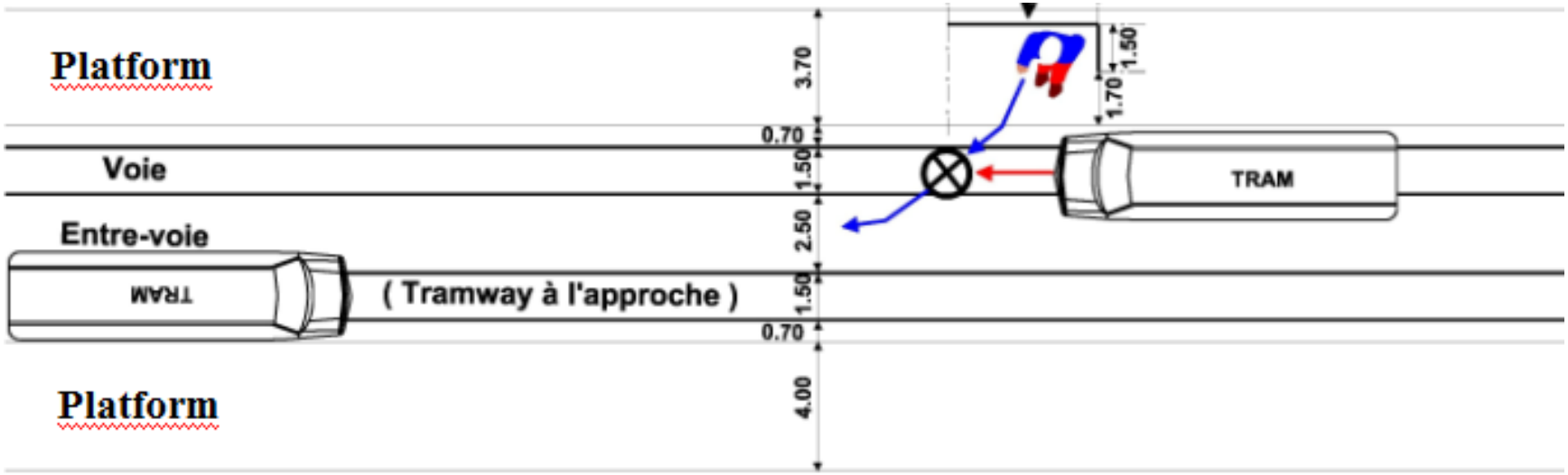
- 55 % of pedestrians involved were between 11 and 25 years old
- 15% of pedestrians were using a distractor (mobile phone, headphone…)
- 7% pedestrians were disabled people (motor, visual, auditory and cognitive problems)
- Tram passengers are involved in
  - 38% of direct accidents with tramways
  - 89% of indirect accidents with tramways

# Main hazards around station (70): a/ direct accidents

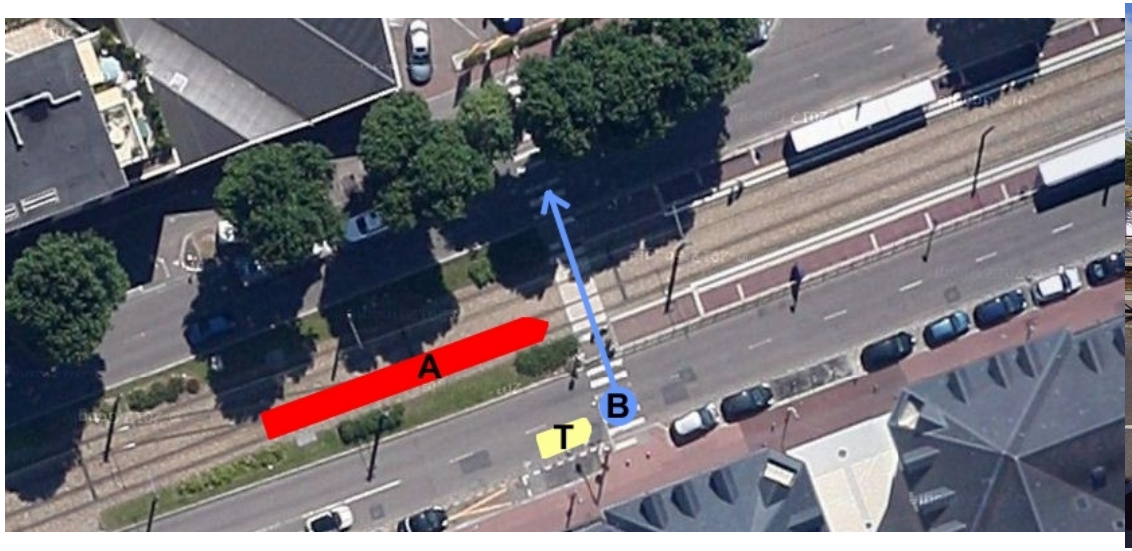
- (1) The pedestrian waits on the platform, falls on the platform or on the track, and is hit by a tram that is coming into the station (9 cases)



- (2) The pedestrian who is waiting on the platform, crosses the tracks between platforms directly when a tram is arriving in the station (8 cases)

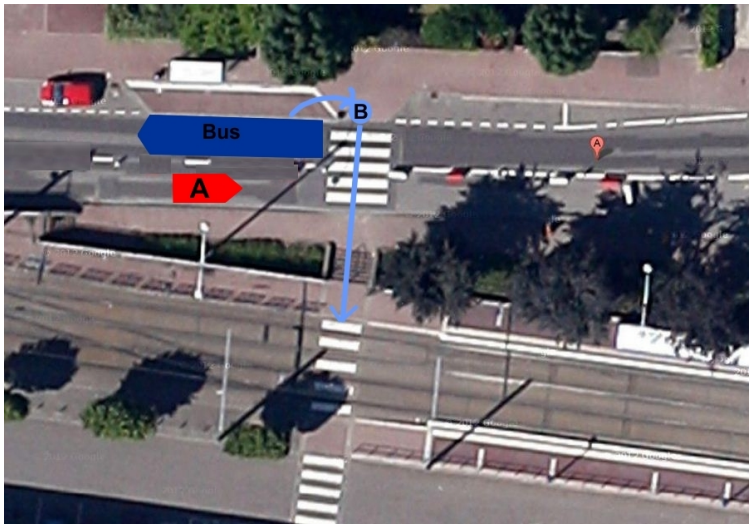


- (3) The pedestrian is crossing the entire street. He is hit by the tram on the first track he encounters (5 cases)

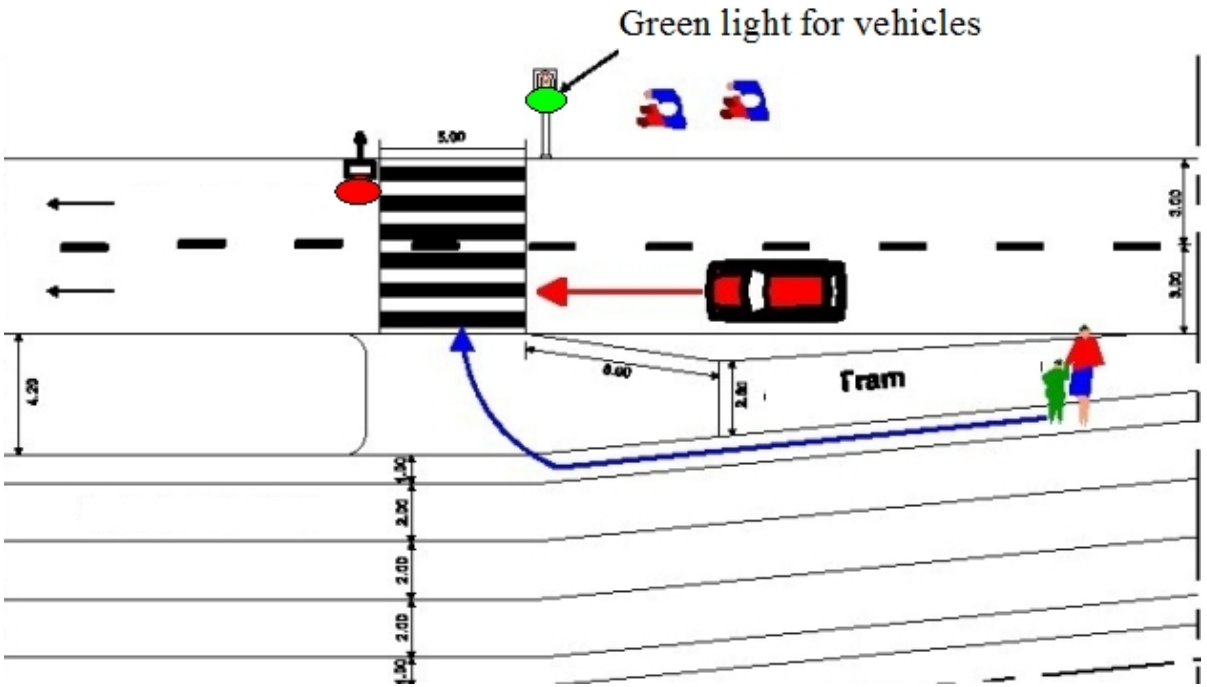



# Main hazards around station: b/ indirect accidents

- (4) The pedestrian suddenly crosses the street to reach the tram. He is hit by a vehicle driving on the street (24 cases)



- (5) The pedestrian crosses the street after getting off the tram. He is hit by a vehicle driving in the street (17 cases)

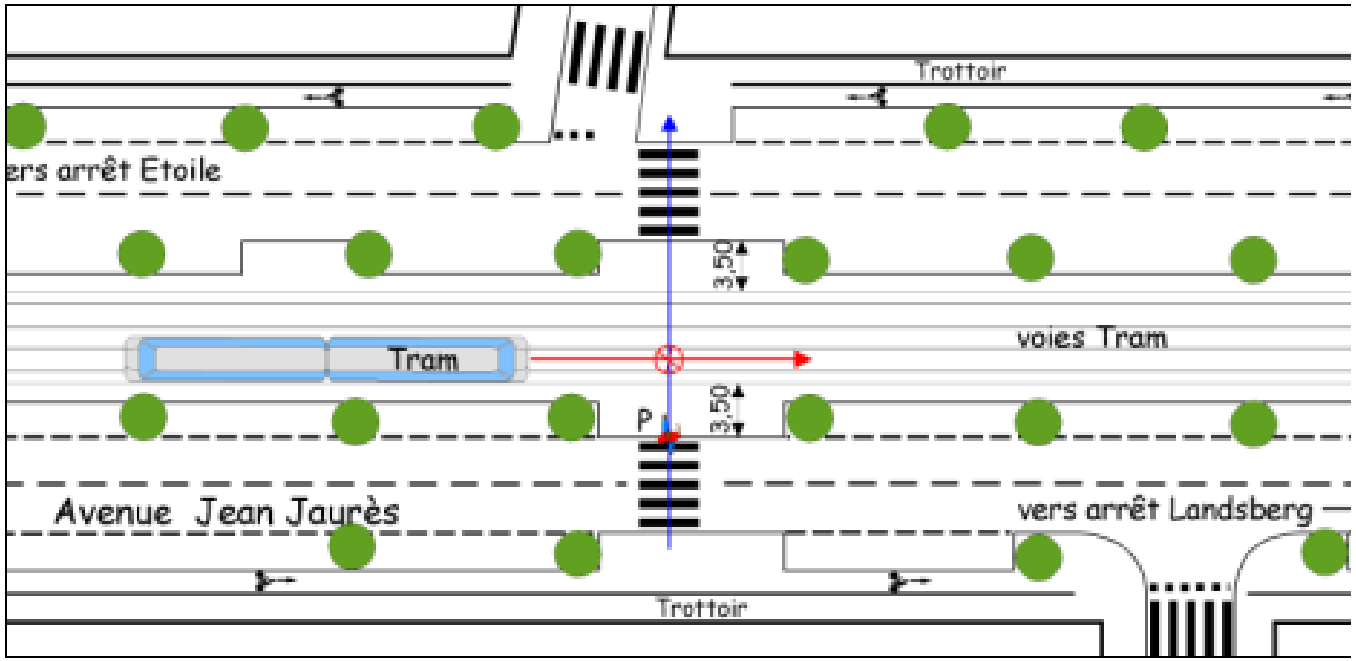


# Synthesis of main hazards around station

| | | Number of accidents in the sample examined |
|---|---|---|
| Pedestrian waiting on the platform, falls and is hit by the tram pulling into the station | | 9 |
| Pedestrian on the platform crosses the tracks directly, outside pedestrian crossings and is hit by a tram pulling into the station | | 8 |
| Pedestrian crosses the entire street and is hit by the tram on the first track he encounters | | 5 |
| Pedestrian suddenly crosses the street to reach the station and is hit by a motorised vehicle | Without visibility being masked | 15 |
| | Visibility masked by a vehicle stopped in general traffic | 9 |
| Pedestrian gets off the tram, suddenly crosses the street and is hit on the street | | 17 |
| Other cases | | 7 |
| Total of pedestrians accidents linked to tramway around station | | 70 |

# Main hazards outside the station (35): direct accidents

- (1) The pedestrian is crossing the entire street. He is hit by the tram on the first track he encounters (19 cases)



# Main hazards outside the station: direct accidents

- (2) The pedestrian is walking along the tram. He suddenly crosses outside a pedestrian crossing when a tram is coming from behind (6 cases)

# Synthesis of main hazards outside the station

| | Number of accidents in the sample examined |
|---|---|
| **Pedestrian crosses the entire street and is hit by the tram on the first track he encounters** | **19** |
| **Pedestrian walks along the tram lanes and suddenly crosses when a tram is coming from behind** | **6** |
| **Other cases** | **10** |
| **Total** | **35** |

# Conclusion

- Pedestrian accidents are a major tram safety issue
- Importance of regarding all pedestrian accidents in relation to tramways (direct and indirect)
- A target in France: young people
- A challenge for Transport operator: safety of tram passengers in their walking access to the tram
- In station :
  - Improving guidance toward crosswalks
  - Adjustments to trafic lights to make crosswalks safer
- Outside station :
  - Raising awareness of the presence of tracks and trams

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# Thank you for your attention

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The complete report is on http://www.territoires-ville.cerema.fr/etude-sur-la-securite-des-pietons-sur-les-axes-tc-a1776.html