

24è Fòrum Barcelona de Seguretat Viària
Temàtica: Motorista, volem la teva seguretat

Road safety of powered two-wheelers
in European cities

Trends and prospects for countermeasures

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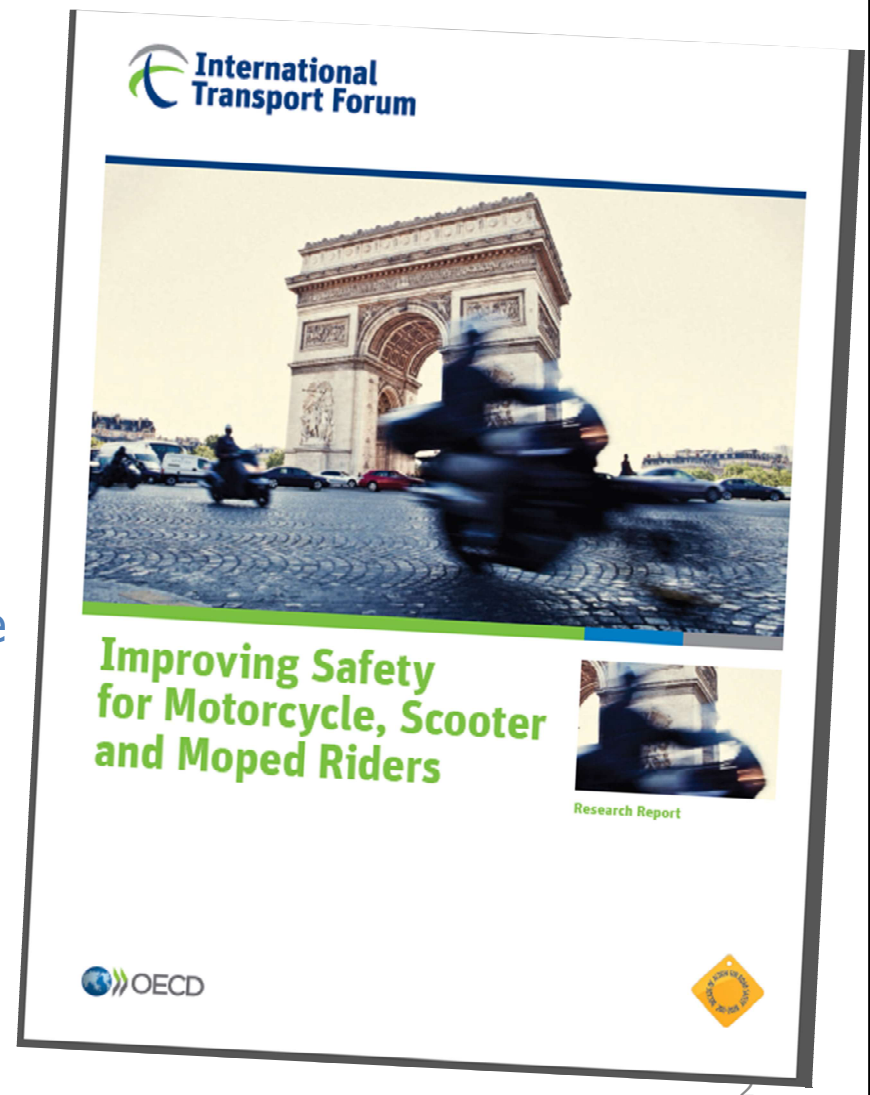
French Institute of Science
and Technology for Transport
Development and Networks



IFSTTAR

ITF Working group on motorcycling safety

- 28 experts representing 18 OECD countries
- A wide range of background and skills
- From research to decision making
- Objectives:
 - Review the latest research works in the field of motorcycling safety
 - Better understand road crash mechanisms and configurations
 - Evaluate most effective measures
 - Make recommendations to decision makers



A booming travel means

- In recent years, the world produces as many two-wheelers than cars (60 million units)

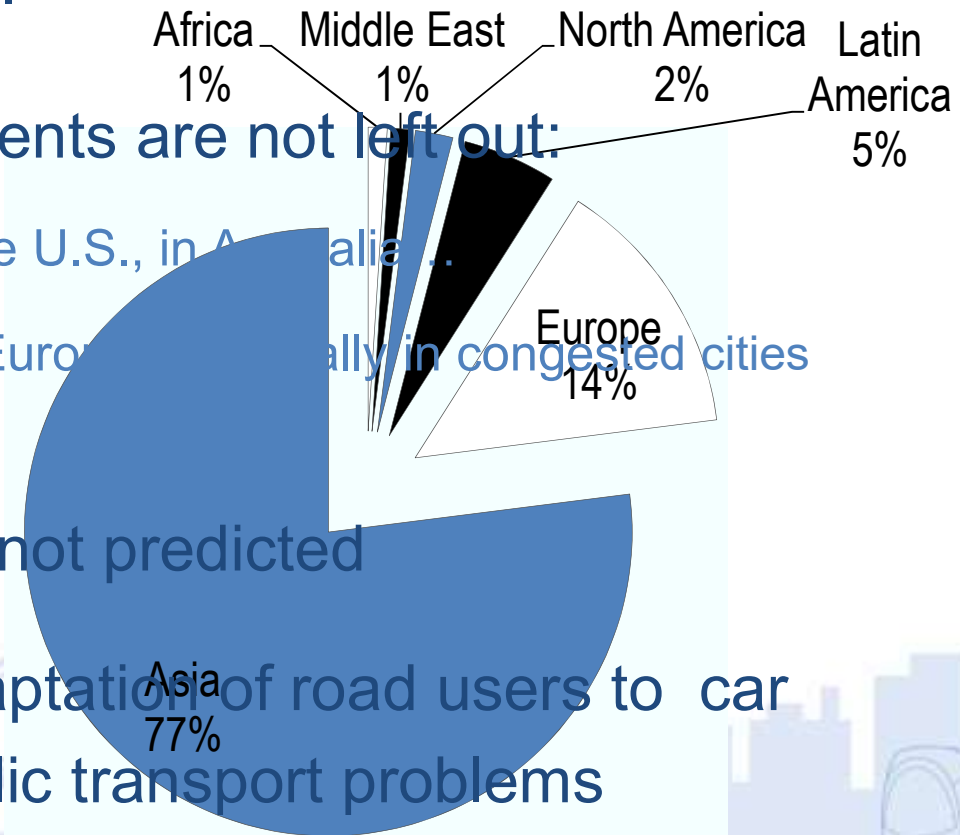
- Asia takes this trend ...

- ... but the other continents are not left out:

- Increased in Brazil, in the U.S., in Australia ...
- 43% increase in use in Europe ... especially in congested cities

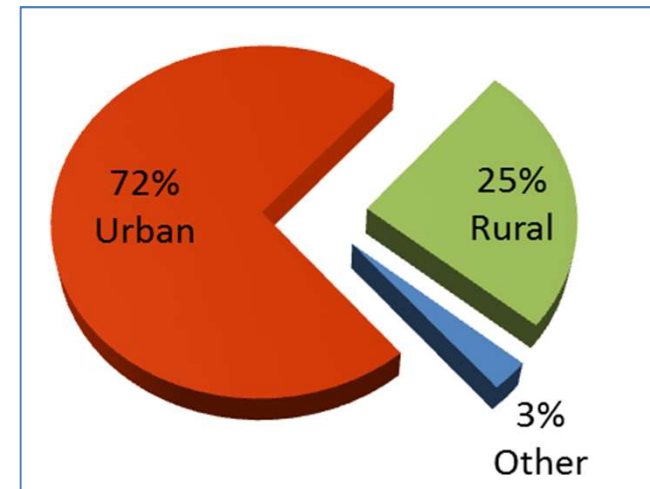
- The rise of PTWs was not predicted

- A spontaneous adaptation of road users to car congestion and public transport problems



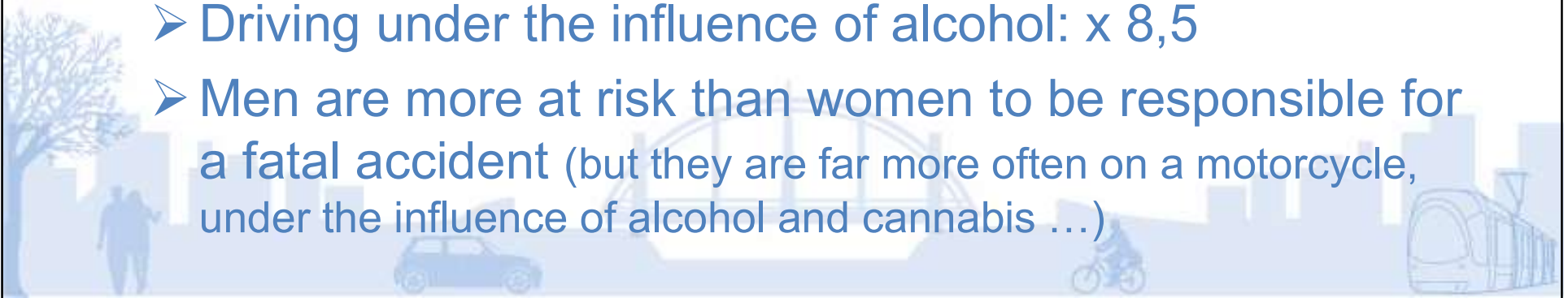
An important urban phenomena

- Explosion of the use of PTW in many European cities : Paris, Barcelona, London, ...
 - Up to 15 % of the traffic share
- ... which is accompanied by a dramatic increase in the number of victims in urban traffic
 - About 50 % of all urban injury accidents
- 72% of PTW Injury accidents in Europe occur in urban area



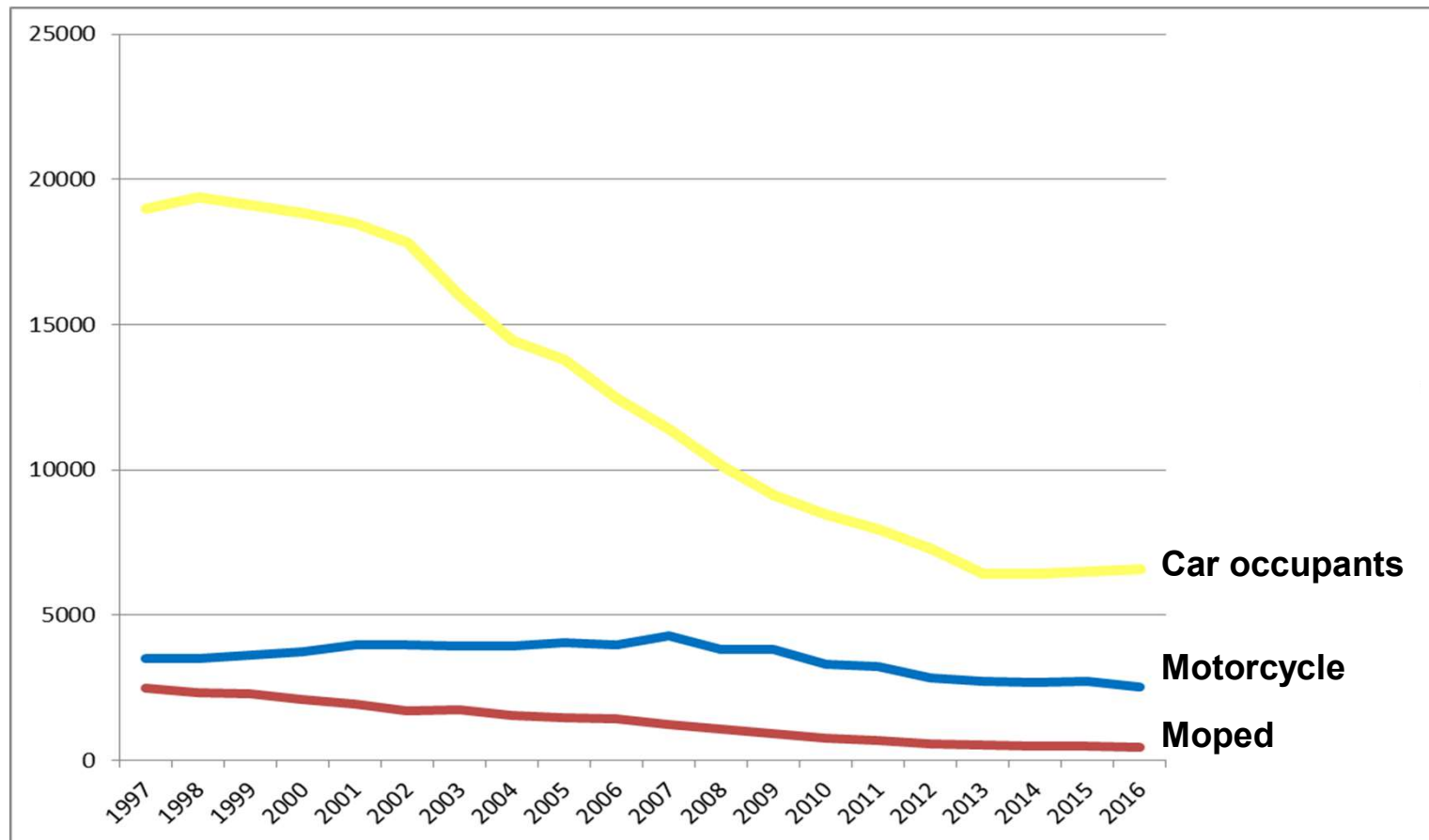
An excessive risk

- Riders are far more at risk than car drivers
 - The risk to be *killed per km* driven on a PTW is **30 times** higher than by car
 - Risk to be *injured per km*: **x 42**
 - Risk to be *severely injured per km*: **x 68**
 - Risk to be *severely injured per unit of time*: **x 120**
- *As a comparison:*
 - Driving under the influence of cannabis : x 2
 - Driving under the influence of alcohol: x 8,5
 - Men are more at risk than women to be responsible for a fatal accident (but they are far more often on a motorcycle, under the influence of alcohol and cannabis ...)



An unequal progress in Europe

- An important progress for cars occupants
- Far less for powered two-wheelers riders

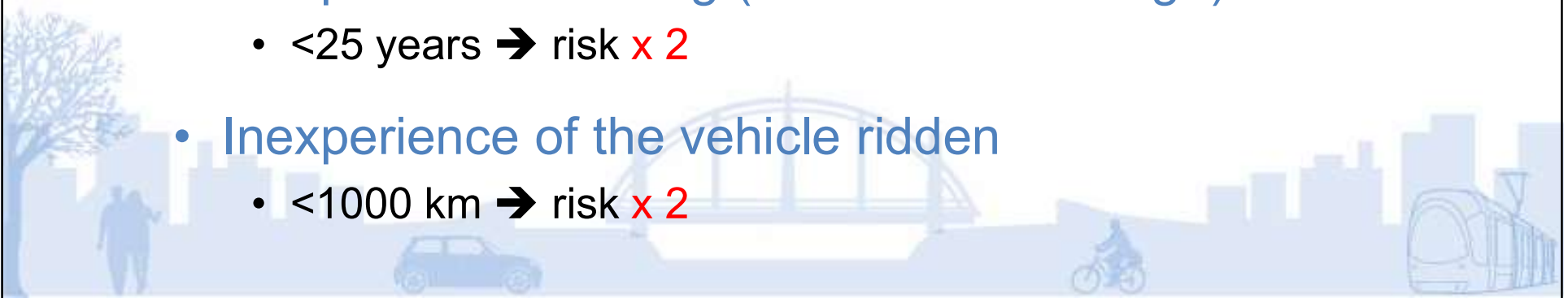


Nb of people killed on the road in Europe

Source : CARE Database (EU-14)

Main risks factors (1)

- *Endogenous factors*
 - Speed (+ acceleration)
 - Excessive speed → risk x 7
 - Inadequate speed → risk x 13
 - Alcohol
 - 0,5 > 0,8 g/l → risk x 4
 - 0,8 > 1,2 g/l → risk x 7
 - > 2 g/l → risk x 10
 - Inexperience of riding (associated with age)
 - <25 years → risk x 2
 - Inexperience of the vehicle ridden
 - <1000 km → risk x 2



Main risks factors (2)

- *Exogenous factors*
 - Weather conditions
 - Road defects
 - Lack of protection (vulnerability)
 - Weight / power ratio

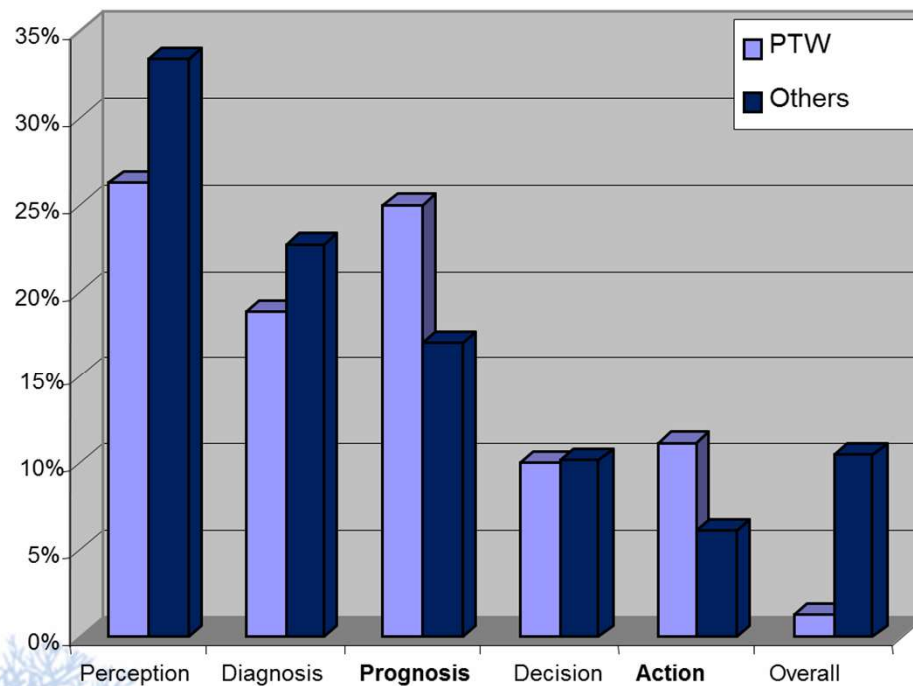


- Lack of "conspicuity" (= difficulty to be detected)

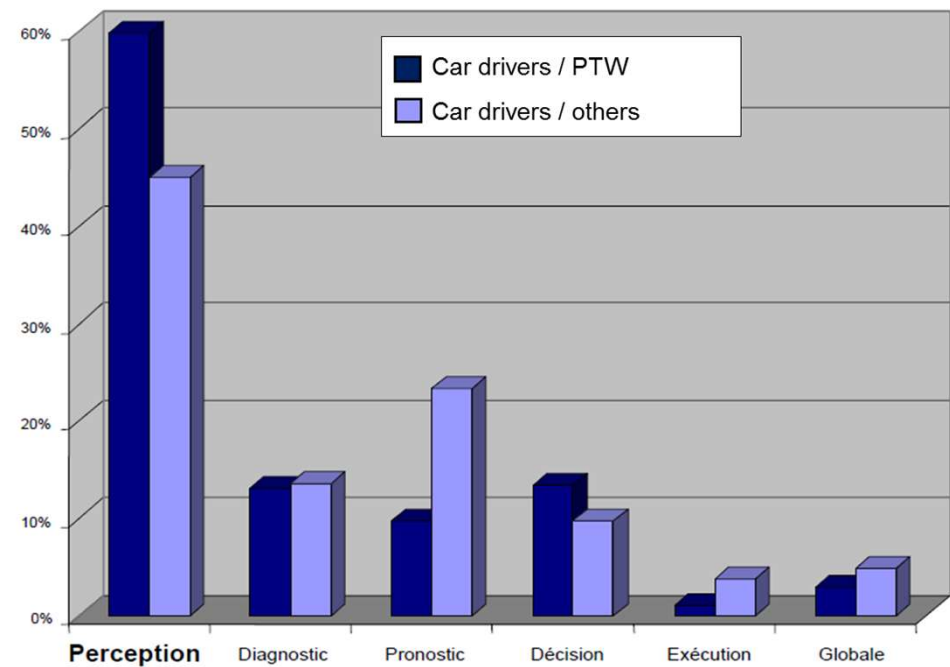
Specific accident mechanisms

Van Elslande (2010)

PTW riders

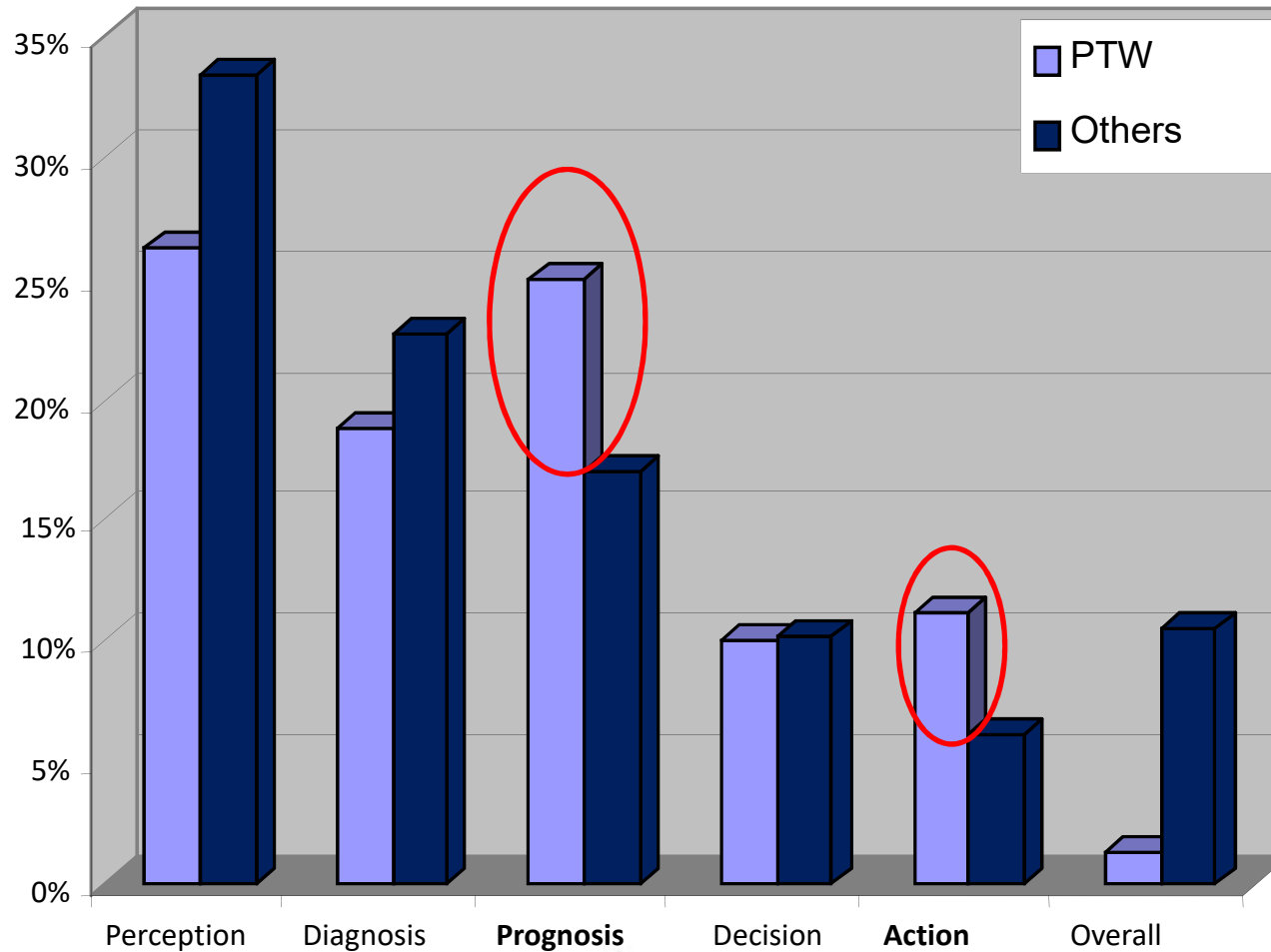


Car drivers



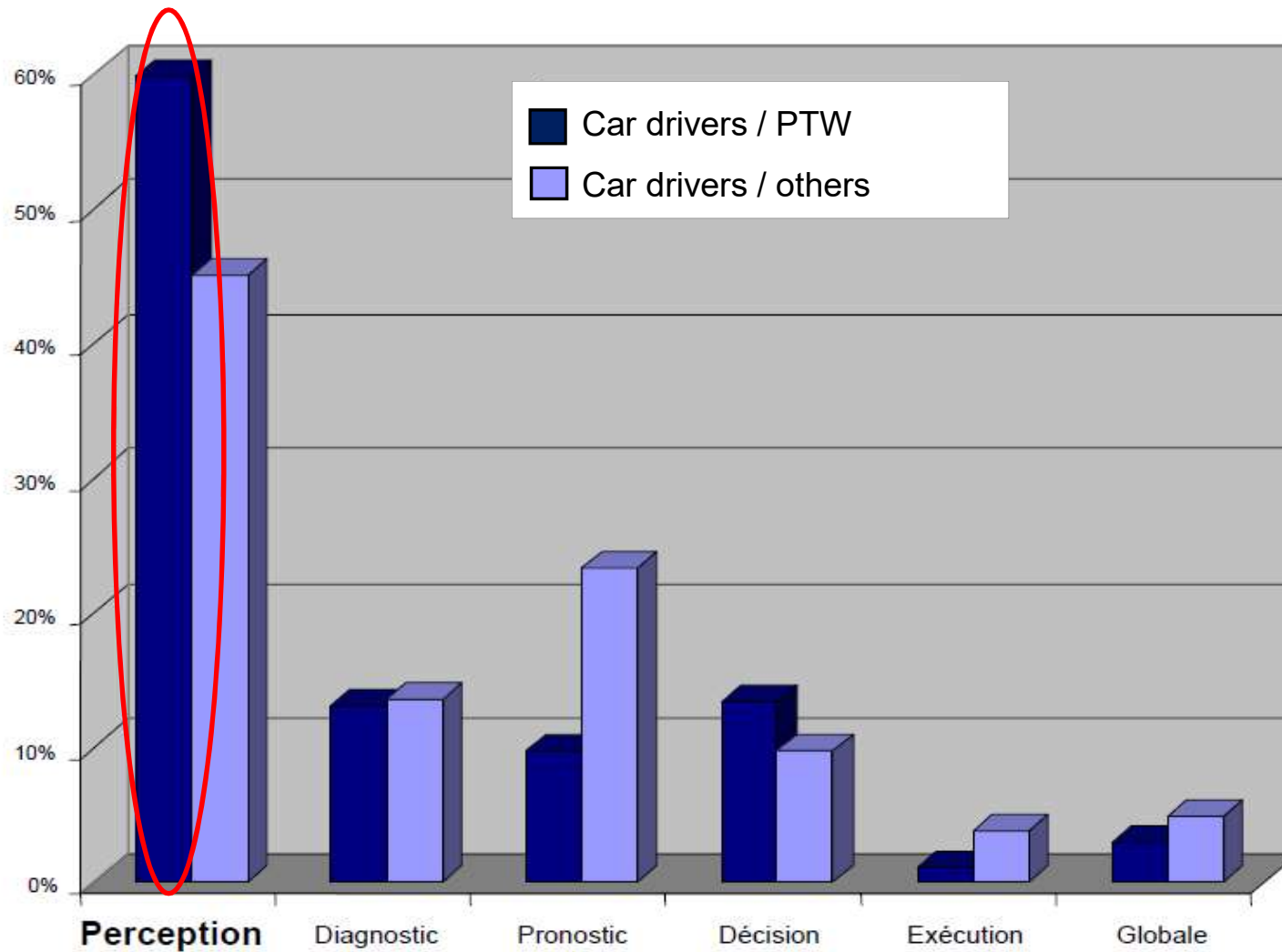
➔ **PTW / CAR accidents are the result of an interaction between failures of prognosis, execution (for PTW) and perceptual failures (for car drivers)**

The errors of PTW riders



- Sure to be seen
- Strong feeling of priority
- Strong confidence in their control capacities

The errors of car drivers face to a PTW

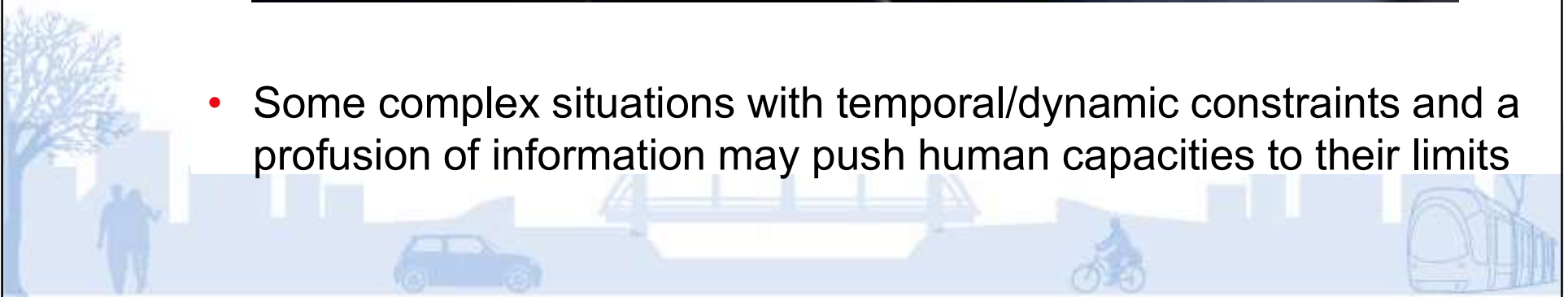


➤ *Why don't car drivers see PTWs?*

Driving is sometimes an over-demanding activity



- Some complex situations with temporal/dynamic constraints and a profusion of information may push human capacities to their limits



A perceptive test



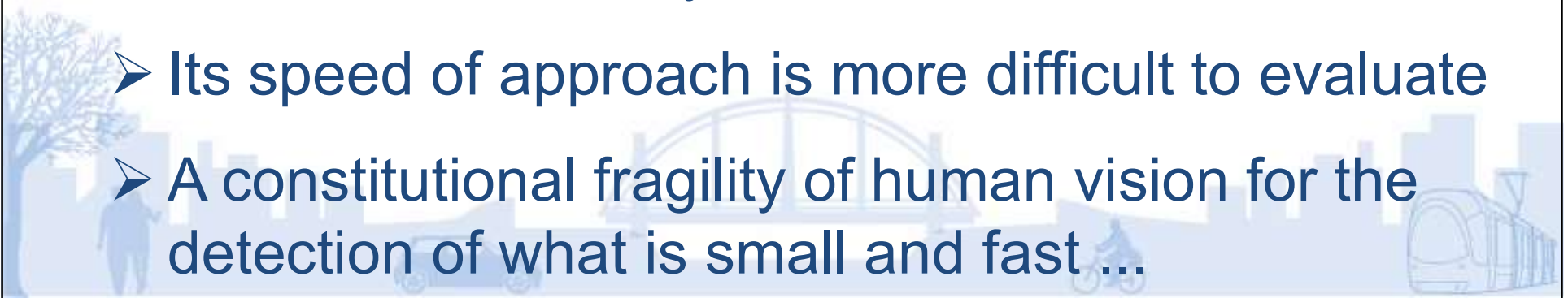
- How many passes are done by the players with a white T-shirt ?
- How many of you have seen the gorilla in the movie?

A risk of confusion between size and distance



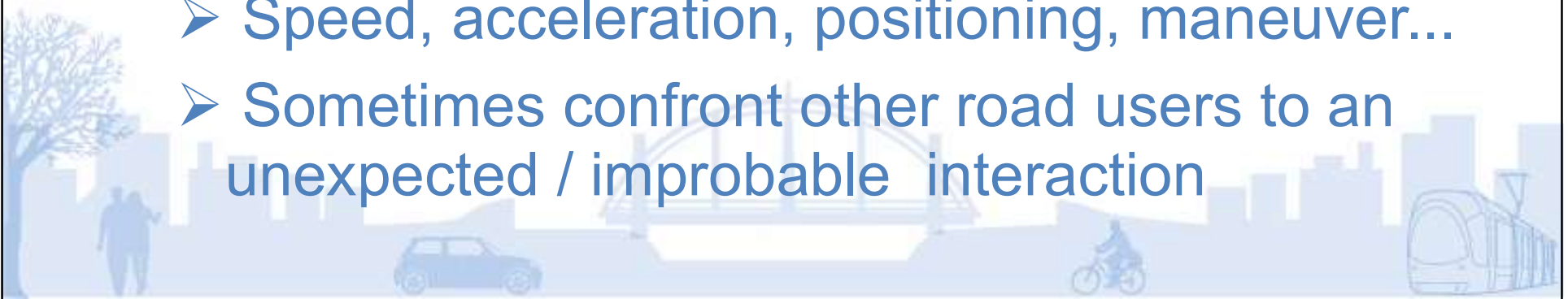
1/ Visual detectability

- A smaller object is harder to detect
- Its distance is more difficult to estimate
 - "small" tends to mean "far"
- Greater sensitivity to visibility masks
 - What does not hide a car can hide a PTW
Sometimes layout elements (signals, etc.)
 - Greater vulnerability to information overload
 - Its speed of approach is more difficult to evaluate
 - A constitutional fragility of human vision for the detection of what is small and fast ...



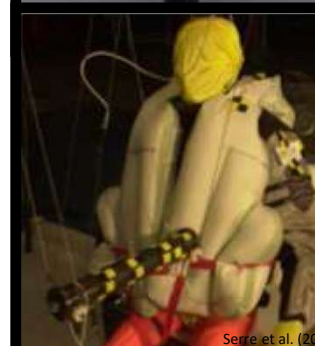
2/ Cognitive detectability

- The less we expect an object, the less we detect it
 - Phenomenon of "attentional blindness"
- DRM averages 2% of the amount of traffic
 - *Beware the gorilla!*
- Atypical behavior of PTWs, leading to a surprise effect
 - Speed, acceleration, positioning, maneuver...
 - Sometimes confront other road users to an unexpected / improbable interaction



Towards finding solutions

- Increase the detectability of PTW
- Protective devices (PPE, Airbag)
- Driving aids (ABS)
- Legislation (GDLS)
- Better consideration of PTW in the layout
- *Improve training toward prevention*
- *Communication / enforcement*



Attempts in European cities

- Traffic calming measures
- Advanced stop lines
- Access to bus lanes
- Riding between lanes ("filtering")



Traffic calming measures



Advanced stop lines

- Originally created for bicycles
- Un uncertain effect on safety for PTW



Allowing access to bus lanes

- London, Stockholm, Barcelone, Madrid, Genève...



- In London: the opening has led to a doubling of the number of motorcycle accidents on the test sites



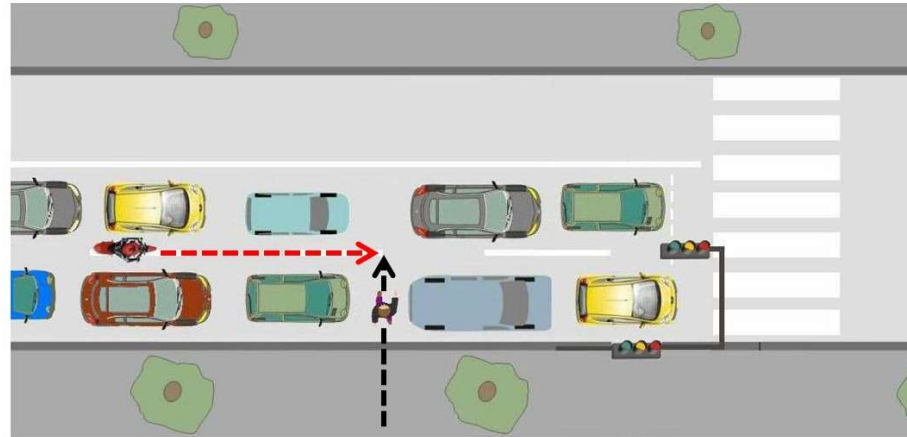
- In Marseille: PTWs circulating in bus lanes have a risk of injury accident 3.25 times higher

Riding between lanes

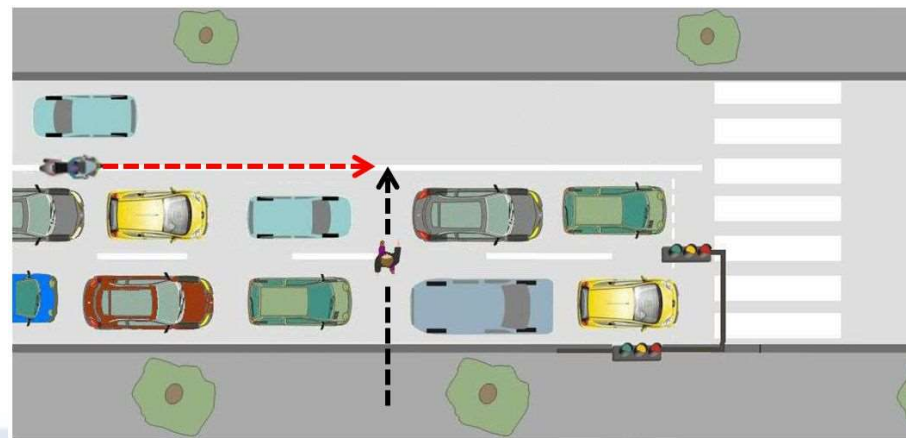
- A practice becoming more common (even if not legal in most countries), due to the increasing congestion in many cities
- Permission given to the PTW to ride between lanes:
 - Sydney, Brisbane, Paris, Lyon, Marseille, Bordeaux...
- But when travelling between lanes a PTW rider has a risk of injury accident per km 4 times higher



A higher risk to hit a pedestrian



PTW: 6 times more likely to hit a pedestrian when filtering



To conclude

- A means of transport
 - Whose use is increasing
 - Who is not devoid of urbanity
 - Travel time saved (Paris): 46 % / passenger cars, 50 % / metro, 127 % / bus)
 - Scooter sharing
- But which is today poorly integrated
- Which should be the subject of more research and development effort



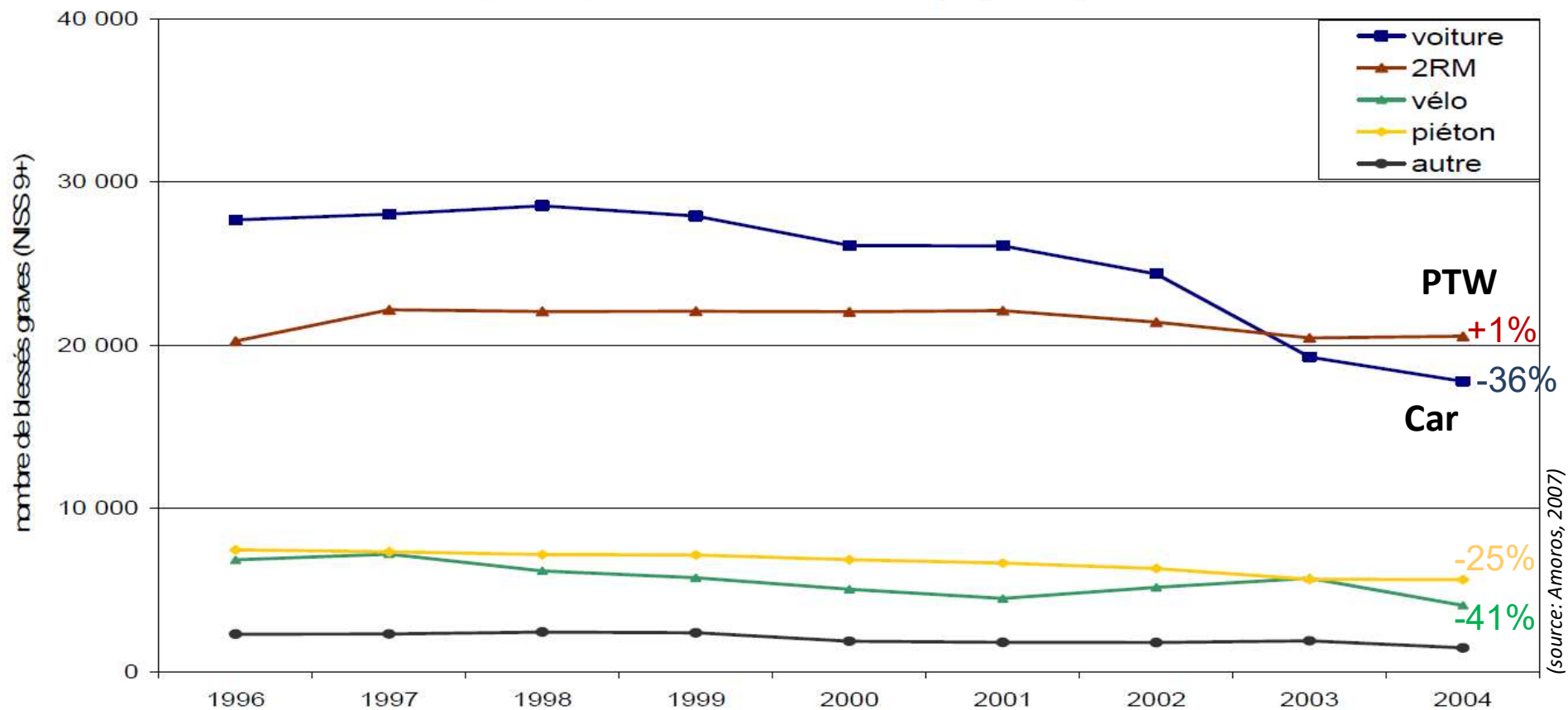
Thank you for your attention

(i)visual and cognitive!

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An emerging public health challenge



(source: Amoros, 2007)

