

# How to use historic accident data for a reliable assessment of traffic safety measurements

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# How to use historic accident data

Motivation: Vehicle safety improved significantly in past decades

► Example: Frontal tree impact (delta-v ~40 km/h)



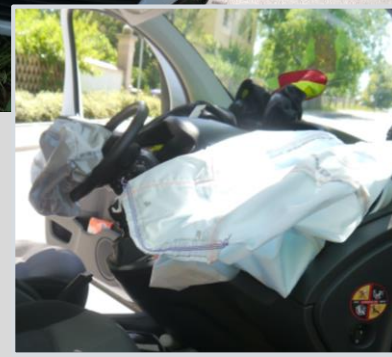
Case **2003**  
**GIDAS**  
GERMAN IN-DEPTH ACCIDENT STUDY

Vehicle registration year **2001**

**No ESP®**

serious injured occupant (**MAIS2**)

Case **2019**  
**GIDAS**  
GERMAN IN-DEPTH ACCIDENT STUDY



Vehicle registration year **2018**

Equipped **with ESP®**

slight injured occupant (**MAIS1**)

# How to use historic accident data

## Mid-term measures leading to changed accident situations

### Direct effects

- Environmental conditions
- Traffic conditions
- Vehicle characteristics  
(active and passive safety)
- Infrastructure
- Traffic participants' behavior
- ...

### Indirect effects

- Season
- Vehicle stock
- Vehicle technology
- User behavior
- Economic situation
- Demographic situation
- Political framework
- ...

Source: Dissertation Nora Reiter: Prognose des deutschen Verkehrsunfallgeschehens unter Berücksichtigung der Fahrzeugsicherheitssysteme, Oktober 2015

# How to use historic accident data

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### Direct effects

- Environmental conditions
- Traffic conditions
- **Vehicle characteristics (active and passive safety)**
- Infrastructure
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### Indirect effects

- Season
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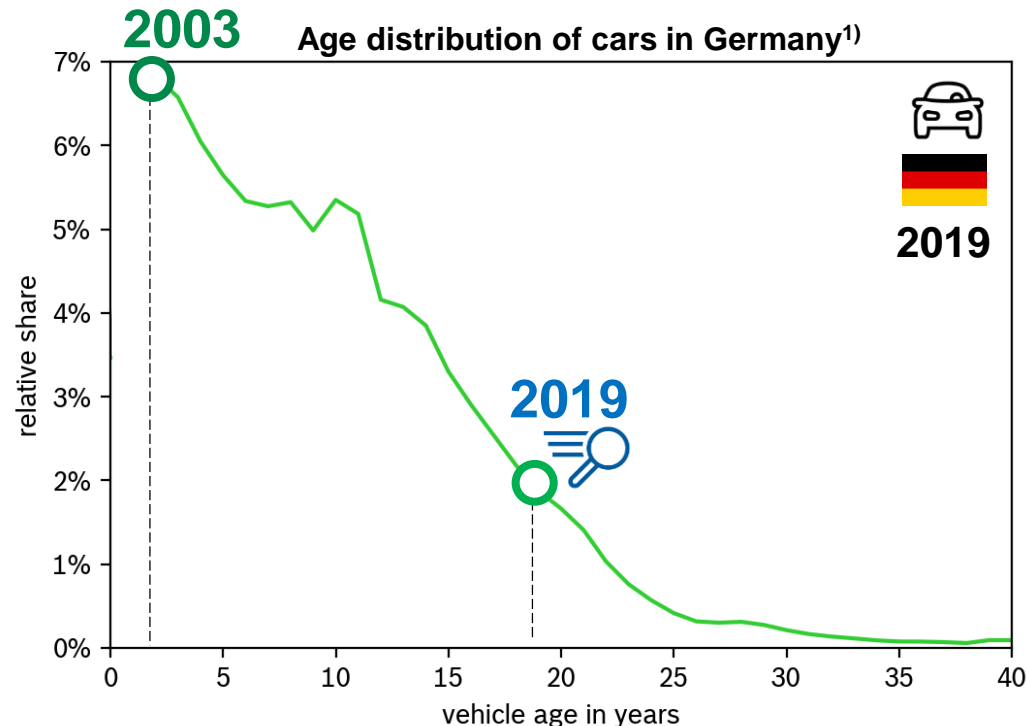
## Improved vehicle safety results in changed accident characteristics

### Vehicle age is relevant measure for vehicle safety



# How to use historic accident data

## Vehicle age distribution of registered cars



**Accident in 2003**  
**2 years old**

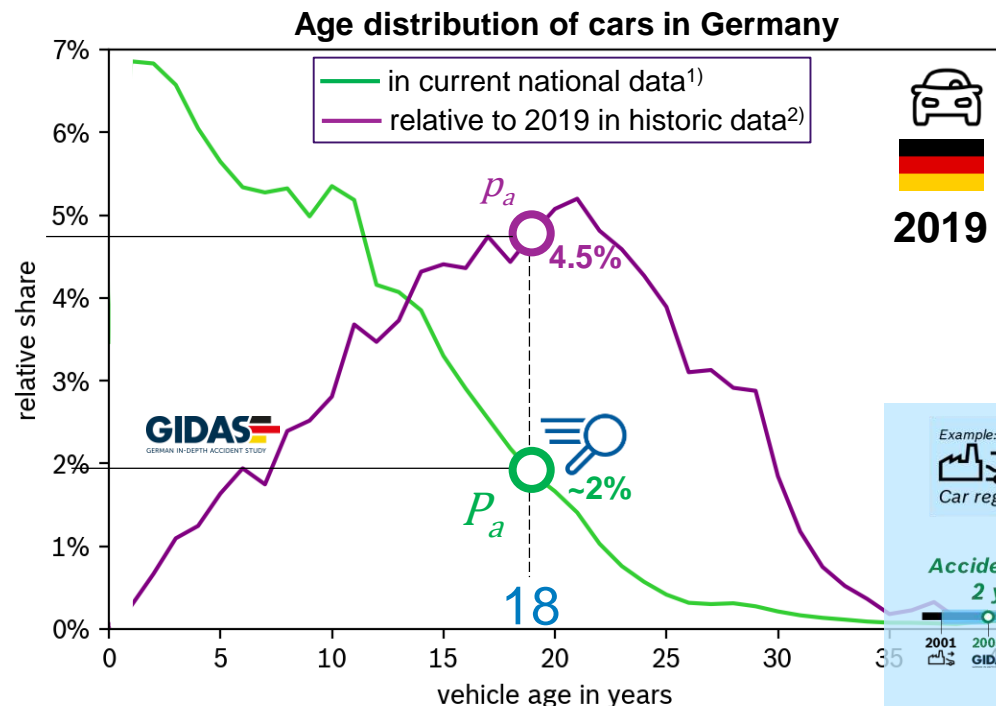


**Older cars are less common in vehicle fleet**

**Expected overrepresentation of old vehicles in historic accident data**

# How to use historic accident data

## Post-stratifying historic accident data with vehicle age



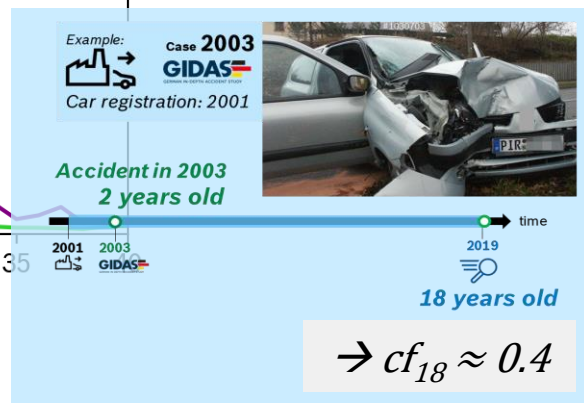
- Calculate **correction factor**  $cf_a$  for each accident
- $cf_a$  depends on combination of participants (vehicle1|vehicle2|...) and respective ages (age1|age2|...)

$$cf_a = \frac{P_a}{p_a}, \text{ with}$$

$a$  ... age of car relative to analysis year

$p_a$  ... share of accidents with cars of age  $a$  rel. to analysis year

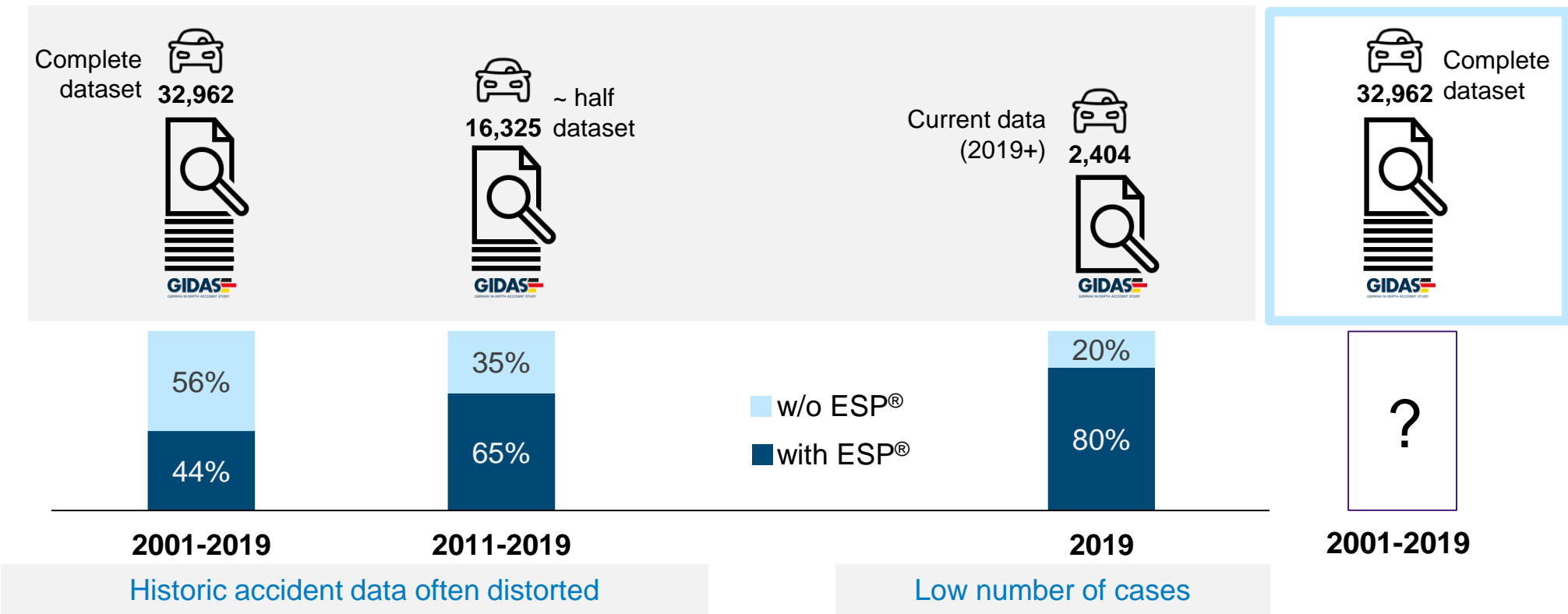
$P_a$  ... share of cars in national data in analysis year



## Share of cars dependent on their age in historic data adapted to current national data

# How to use historic accident data

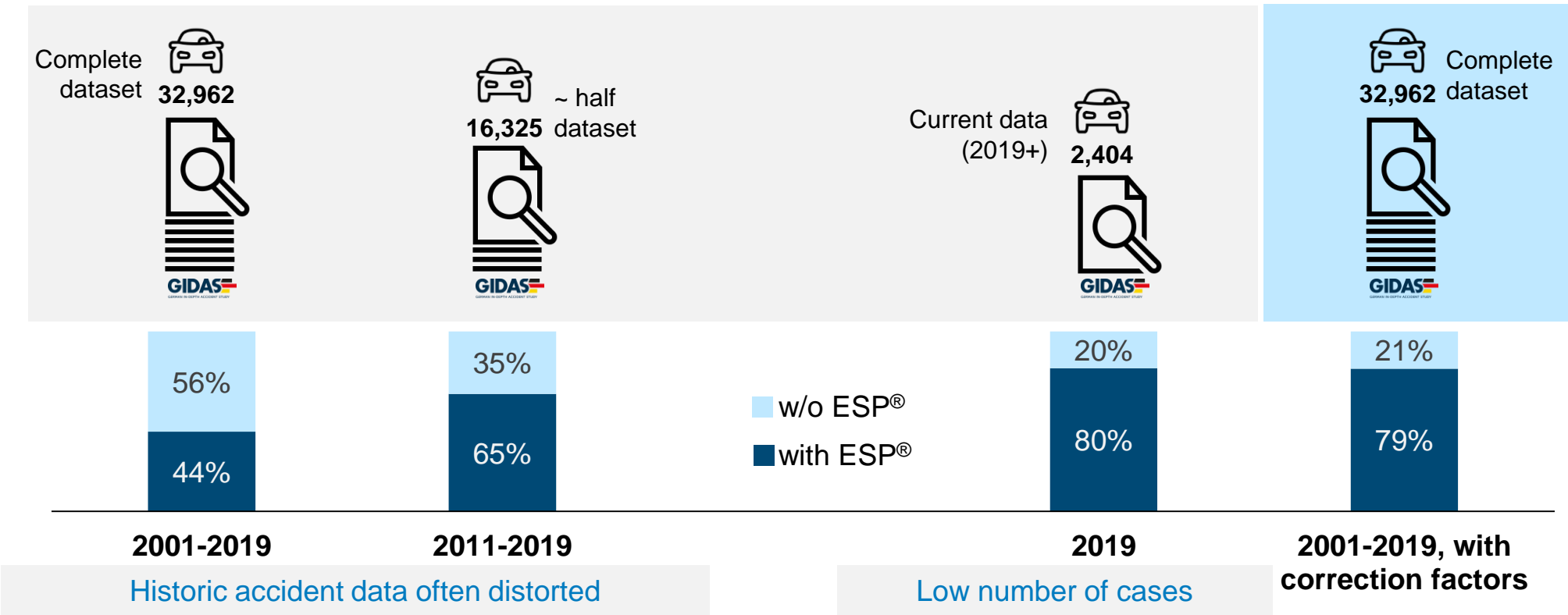
## Example: ESP® equipment of cars in GIDAS



Applying post-stratification to correct time changing characteristics

# How to use historic accident data

## Example: ESP® equipment of cars in GIDAS

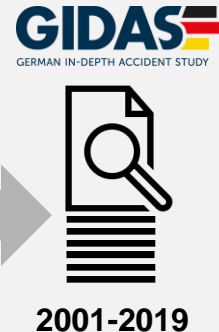
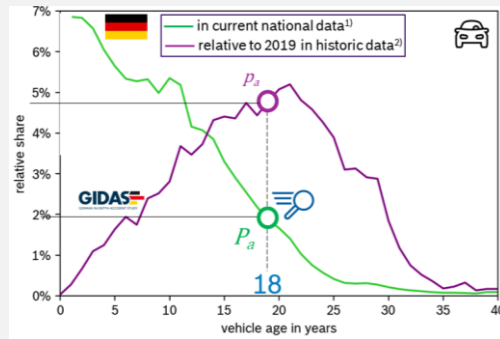
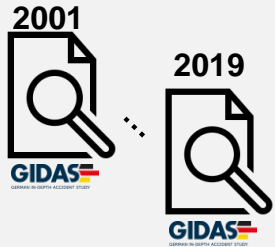


Share of cars with ESP in the complete dataset corresponds to that in current data

# How to use historic accident data for a reliable assessment of traffic safety measurements

## Summary

- Vehicle age reflects vehicle safety status
  - Post-stratifying historic accident data to the age distribution in the current vehicle fleet
- Mapping of historic accidents onto current accident statistics
- Applicability of full dataset



## Next step

- Extrapolation to Germany

**STATIS**  
Statistisches Bundesamt

- Using, e.g.,
- accident type
  - severity
  - location



# THANK YOU FOR YOUR ATTENTION

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