

GRSP Informal Working Group on Child safety  
Paris Meeting, 25<sup>th</sup> November 2008

## CRS Classification

# Introduction

- Informal Working Group on Child restraint Systems of WP29 considers to change the classification of CRS
- When thinking of classification it seems to be crucial to rethink reasons for the mandatory use of CRS

# Why Using a CRS

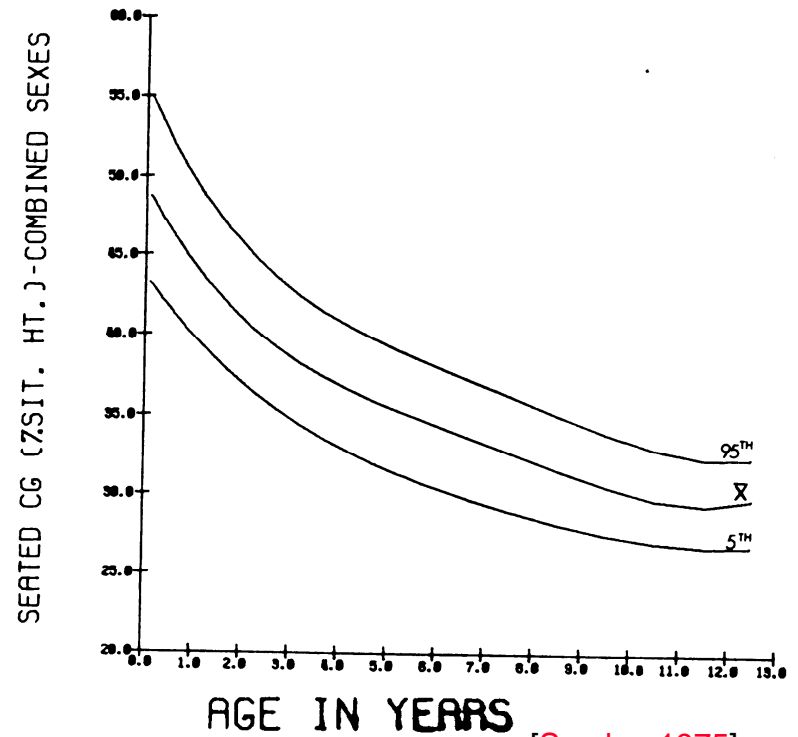
- Size
- Child CoG
- Vulnerability of neck
- Vulnerability of abdomen

# Size

- Belt fit especially at
  - neck
  - abdomen
- Depending on seating height

# CoG

- Child centre of gravity does not necessarily match with three-point-belt load path
  - risk of ejection
- Depending on ???
  - age??
  - stature?
  - seating height

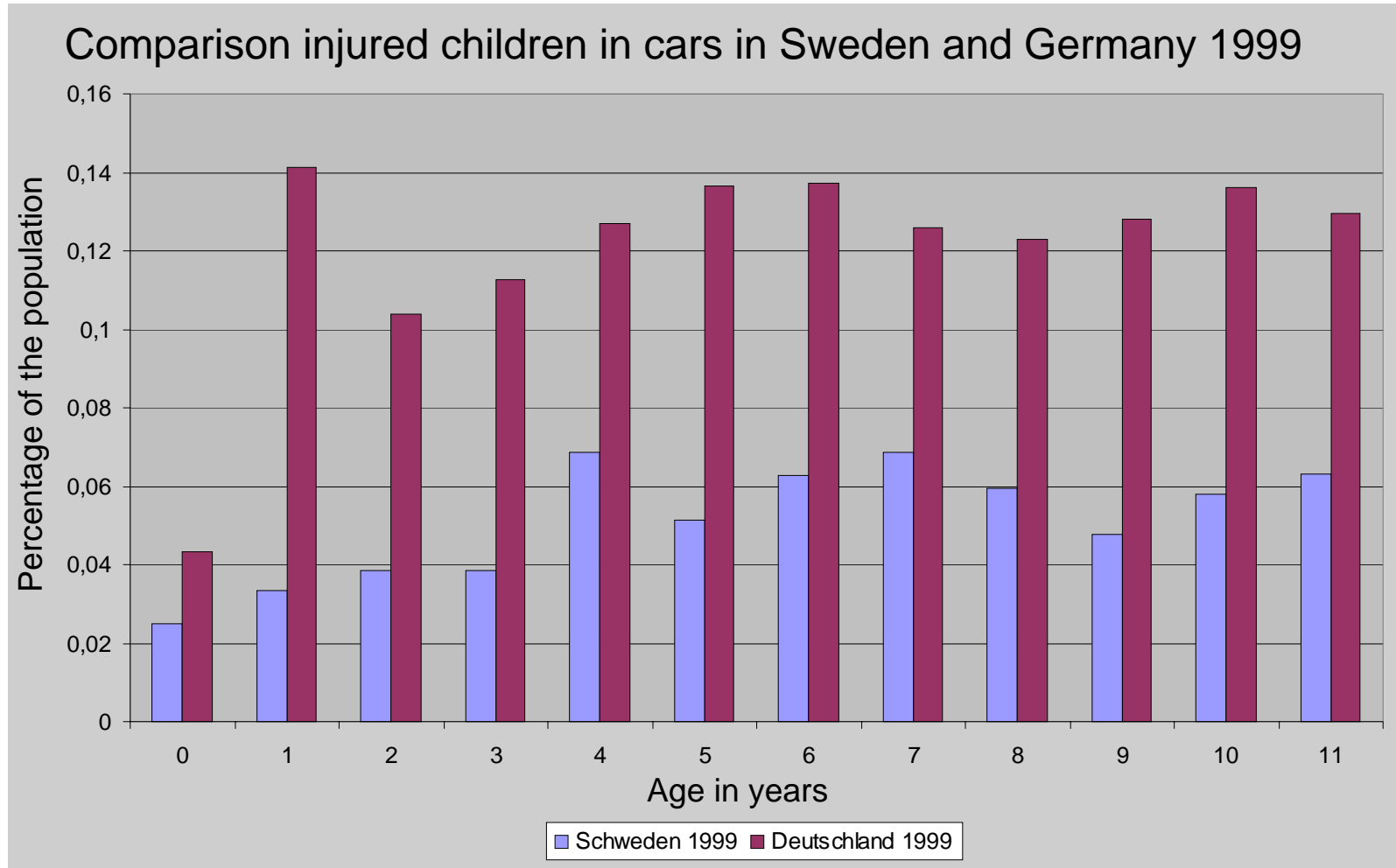


[Snyder, 1975]

# Vulnerability of Neck

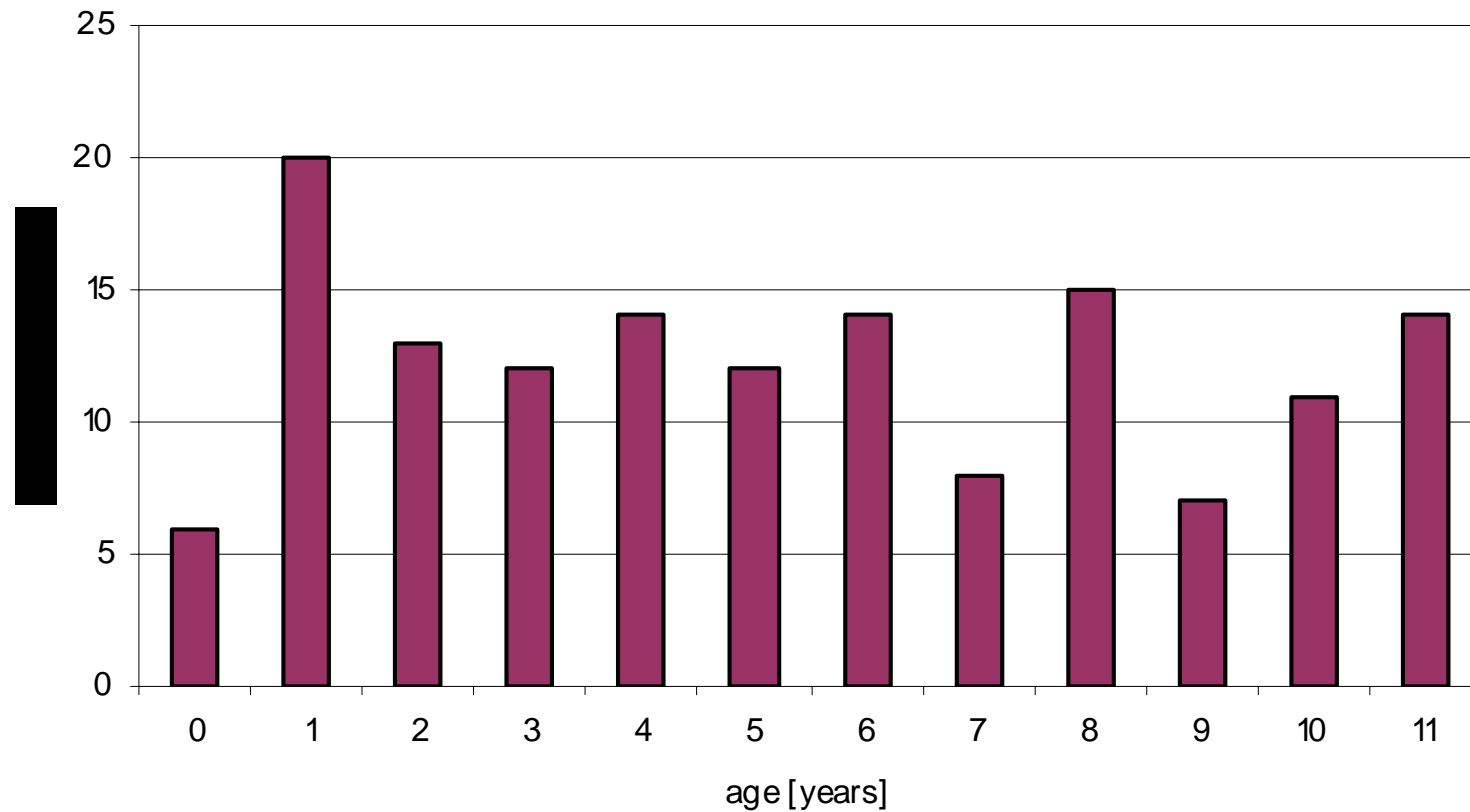
- High relative head mass in babies
- Lower protection by muscles
- High risk of neck injuries for babies
- Depending on age?

# Change from RF to FF too Early in Germany?



# More Recent Data Germany

2004-2006





# Vulnerability of Abdomen

- Less protection in younger children
- Development of iliac crest until puberty
- Depending on age?
- Relevant for classification?
  - Main issue is upper limit of largest group

# Who needs which Protection

- Babies:
  - protection of neck
- Young children:
  - protection of abdomen and
  - protection against ejection
- Older children:
  - protection of abdomen (less important for classification as already covered by the mandatory limit for CRS use)
  - protection against ejection
  - protection against wrong belt fit

# Comparison ECE R44 and NL Proposal

	ECE R44	NL Proposal	Q-Dummies
FF not allowed	< 9 kg (< 75 cm)	(< 9.5 kg) < 74 cm	Q1: 9.6 kg, 74 cm
ISOFIX / harness system	< 18 kg (< 108 cm)	(< 14.5 kg) < 98 cm	Q3: 14.6 kg, 98.5 cm
“0+“	< 13 kg (< 91,5 cm)	(< 11 kg) 50 – 80 cm	Q0:      Q1.5: 3.4 kg,    11 kg, ??         80 cm
“I“	9 – 18 kg (75 – 108 cm)	(9.5 – 14.5 kg) 74 – 98 cm	Q1:      Q3: 9.6 kg,    14.6 kg, 74 cm     98.5 cm

# Discussion of NL Proposal

- Why minimum size for 50 – 74?
  - Are children being smaller than 50 cm not allowed to travel in cars?
  - 5<sup>th</sup> percentile new born 46 cm
- Maximum size 140 cm
  - 2003/20/EC needs to be revised or proposal needs to be adopted to 150 cm
- Why classification for “0+” smaller than in ECE R44?
  - One of the major problems is early change from RF to FF
  - Limitations for size of baby shell within ECE R44
    - belt length in combination with
    - chest Z acceleration
    - Dashboard contact
  - Limitations not necessarily valid for new regulation
    - ISOFIX
    - new dummies
- Why ISOFIX and integral smaller than in ECE R44?
  - Original goal was different

# German Proposal

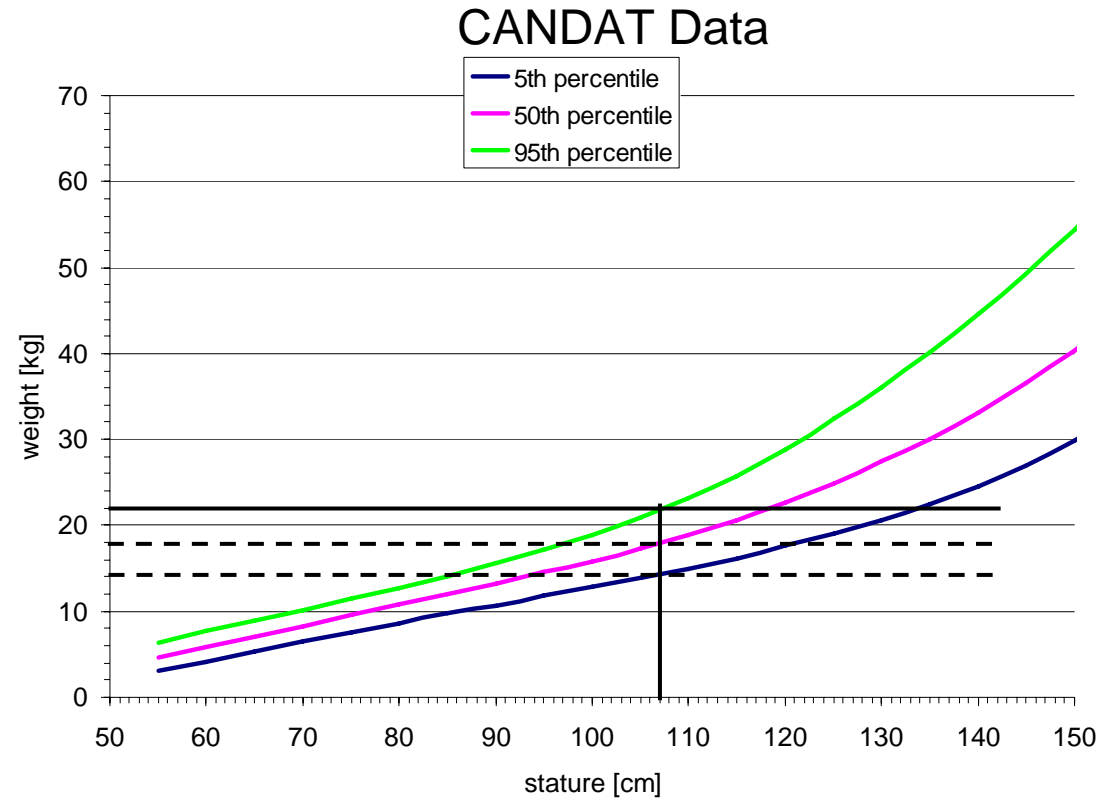
- Most important goal is to have later change from RF to FF compared to today
  - 18 months should be acceptable
  - Overlap between RF and FF class must be as small as possible
- Classification according stature not optimal
  - for structural issues weight is most important
- Two options to deal with stature as classification system and weight limitations
  - definition of stature and maximum weight
    - more complicated than current situation
  - definition of stature taking into account the maximum weight
    - definition of maximum stature according to 95<sup>th</sup> percentile prevents from late change to the next CRS class
- Both options show considerable short comings

# German Proposal

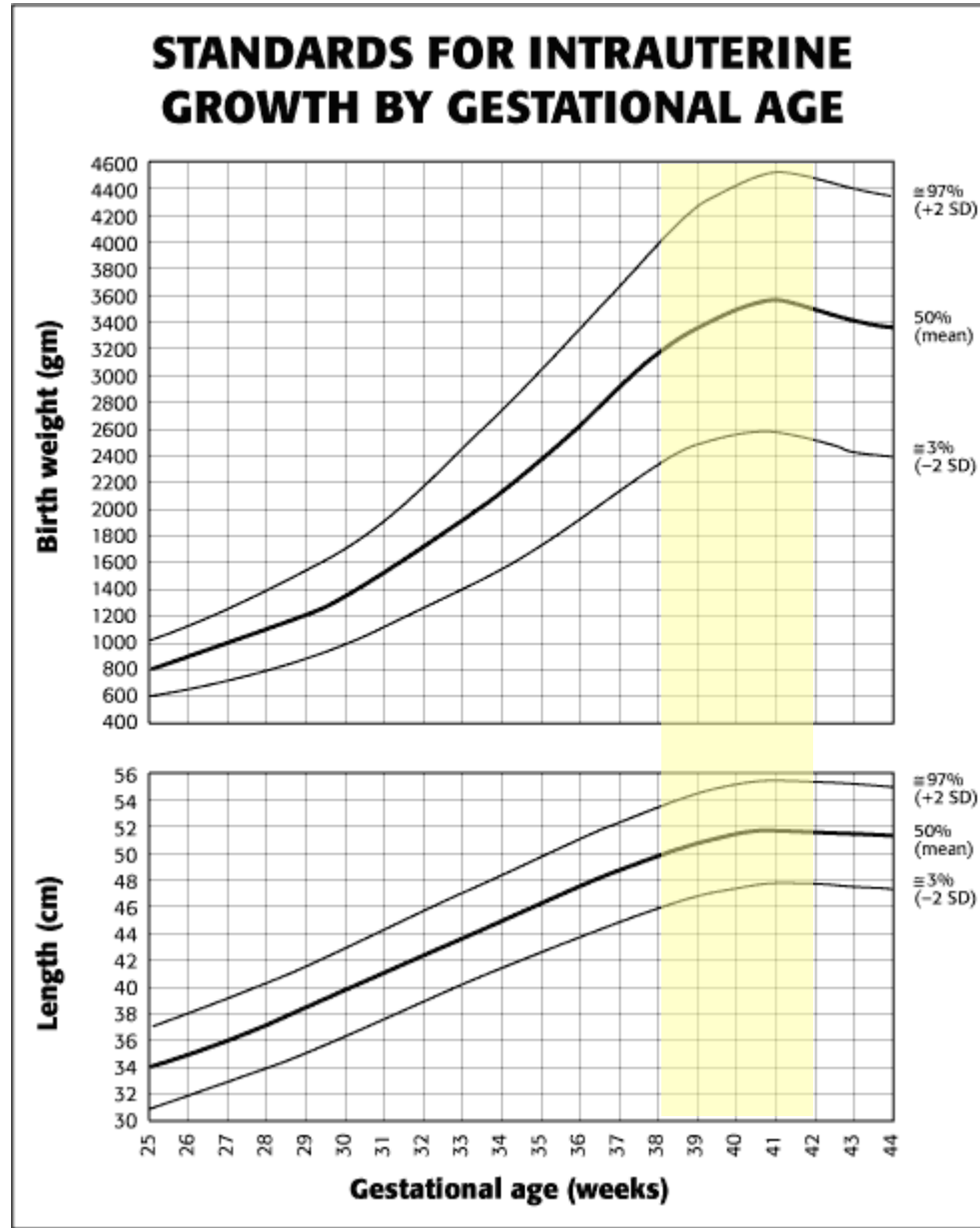
- Although weight seems to be best option the current discussion seems not to allow a classification according weight
- Classification according dummy sizes seems not to be best option
  - Dummies should behave like children and not children like dummies
  - If classification different from dummy sizes => additional geometry check of CRS necessary
- Figures should allow easy handling (e.g. 100 cm better than 98 cm)
- Largest FF class to allow backless boosters for accommodating “oversized” children and to overcome car fit problems

# German Proposal

- Definition of stature taking into account maximum weight
- Example ISOFIX
  - Today's ISOFIX anchorages are designed for 22 kg child
  - 95<sup>th</sup> percentile 22 kg child: stature limit 107 cm
  - Stature of 107 cm reached at 18 kg for 50<sup>th</sup> percentile
  - Stature of 107 cm reached at 14 kg for 5<sup>th</sup> percentile



# Birth Stature





# German Proposal

<b>NL proposal</b>	<b>D proposal</b>
<b>50-74*+</b>	<b>40-80*+</b>
<b>50-80*+</b>	<b>75-90*+</b>
<b>74-98+</b>	<b>85-105+</b>
<b>98-114</b>	<b>100-130</b>
<b>114-140</b>	<b>130-150~</b>
<b>* not FF</b>	<b>~ without lateral impact requirements</b>
<b>+ ISOFIX</b>	

# German Proposal

- Proposal does not fit with dummy properties
  - geometrical dimensions
  - weight
- However, check of limits necessary
  - Modified dummies?
  - Definition of geometrical requirements?
  - Additional load?