

4th ecpr General Conference  
Pisa, Italy, 6-8 September 2007  
Seat bias formulas in PR systems

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## Seat Bias Formulas in Proportional Representation Systems

1. General three-factor formula
2. Special two-factor formula

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### General three-factor formula

$$\left(q - \frac{1}{2}\right) \cdot \left(\frac{1}{j} + \frac{1}{j+1} + \dots + \frac{1}{\ell} - 1\right) \cdot (1 - \ell t)$$

method • party rank • threshold  
Rank  $j$  signifies the  $j$ th-largest out of  $\ell$  parties.

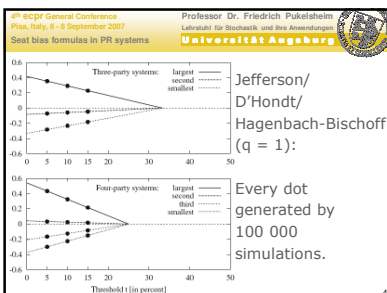
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Threshold contribution is negligible:

Seat apportionment among parties:  
 $\ell$  small,  $t = 3\%, 5\% \Rightarrow (1 - \ell t) \approx 1$

Seat apportionment among districts:  
 $\ell$  large,  $t \approx 0\% \Rightarrow (1 - \ell t) \approx 1$



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### Special two-factor formula

$$\left(q - \frac{1}{2}\right) \cdot \left(\frac{1}{j} + \frac{1}{j+1} + \dots + \frac{1}{\ell} - 1\right)$$

method • party rank

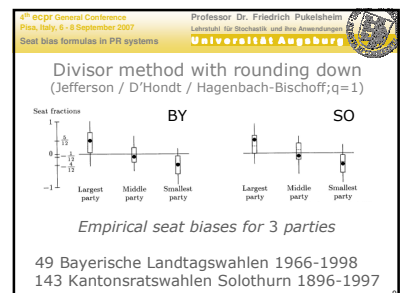
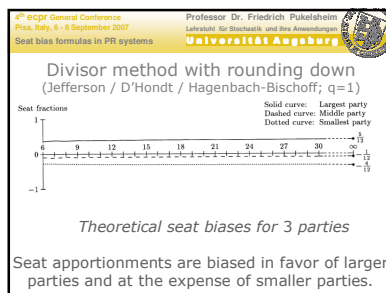
Party rank  $j = 1$ : largest party  
Party rank  $j = 2$ : second-largest party, etc.

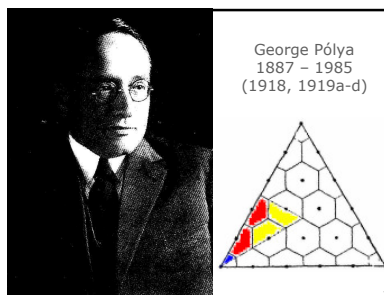
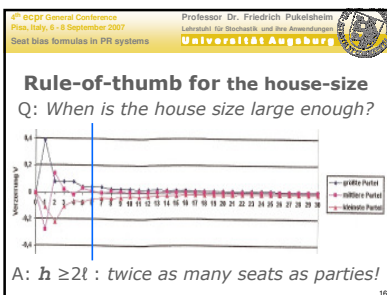
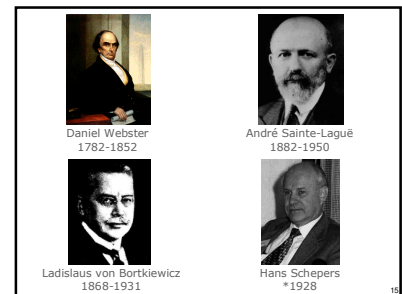
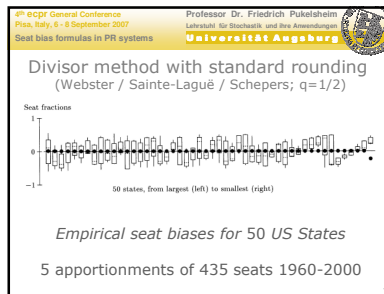
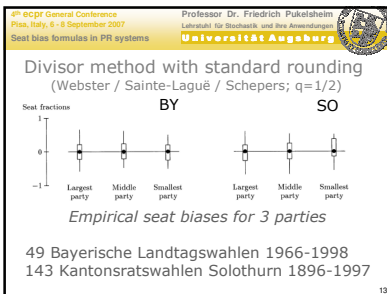
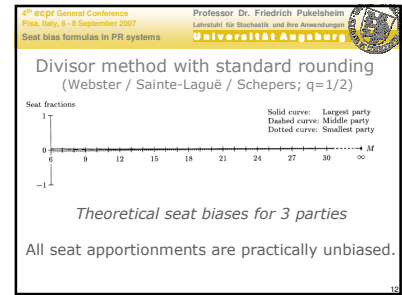
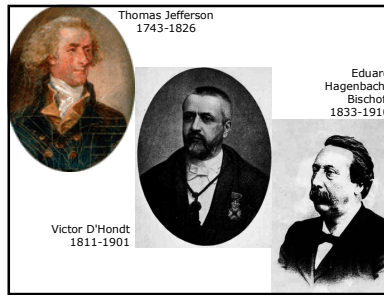
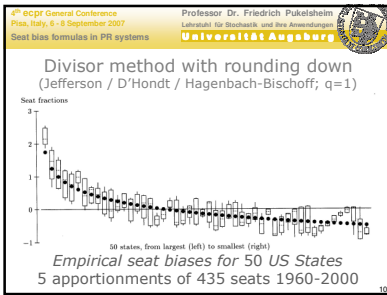
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### Divisor methods with stationary rounding are determined by a parameter $q \in [0, 1]$

$q=1$ : DivDwn (Jefferson/D'Hondt/Ha-Bi)  
 $q=1/2$ : DivStd (Webster/Sainte-Laguë/Sch)  
 $q=0$ : DivUp (Adams)





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... many data sets and apportionment methods:

[www.uni-augsburg.de/bazi](http://www.uni-augsburg.de/bazi)

Berechnung von  
Anzahlen mit  
Zuteilungsmethoden  
im Internet

Calculation of  
Allocations by  
Apportionment methods  
in the Internet