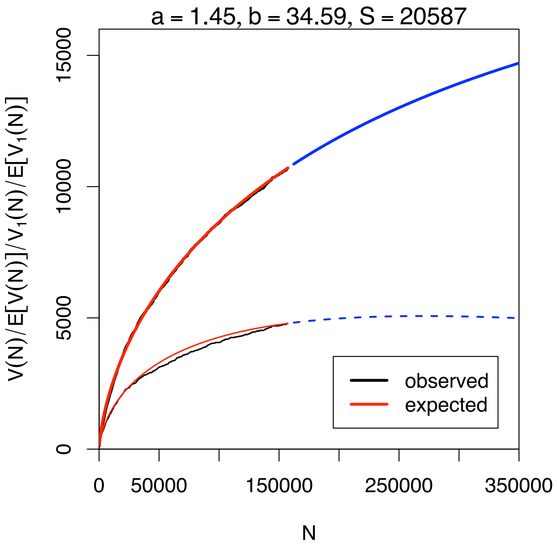
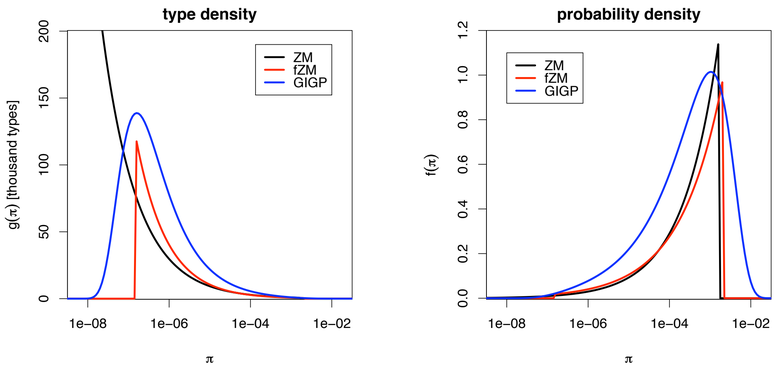
## Word frequency distributions & LNRE models

- type-token statistics for any type-rich population with Zipf-like probability distribution (LNRE = Large Number of Rare Events, Baayen 2001)
- extrapolation of vocabulary growth & frequency spectrum to larger samples (➠ morphological productivity, vocabulary richness, stylometry, data sparseness, etc.)
- estimation of vocabulary size from small samples (e.g. sentence patterns or word senses)
- prior distribution in Bayesian inference & population model for Good-Turing smoothing
- reliability of statistical inference for low-frequency data from Zipfian population (Evert 2004)




- random sampling from LNRE models
- distribution and density functions
- expectations and variance/covariance for V(N) and frequency spectrum $V_k(N)$




$$g(\pi) := C \cdot \pi^{\gamma-1} \cdot e^{-\frac{\pi}{c} - \frac{b^2 c}{4\pi}} \qquad g(\pi) := \begin{cases} C \cdot \pi^{-\alpha-1} & A \le \pi \le B \\ 0 & \text{otherwise} \end{cases}$$

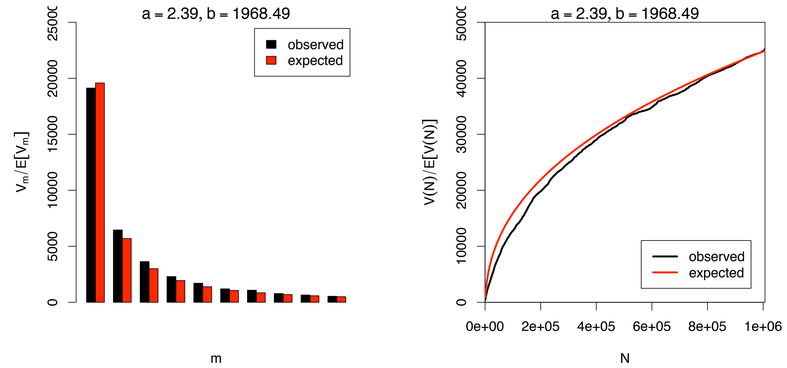
**GIGP** **ZM** (A=0) & **fZM**

*user-friendly LNRE modelling*

zipfR

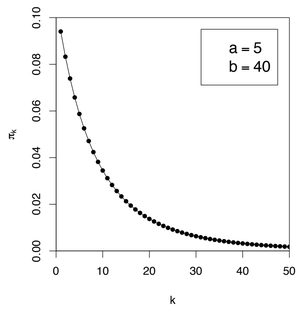
available on CRAN

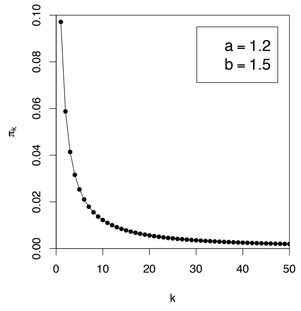
*http://purl.org/stefan.evert/zipfR*




## Parameter estimation

- robust & flexible parameter estimation
- 4 minimisation techniques
- 5 customisable cost functions
- user-specified model parameters
- goodness-of-fit (multivariate chi-squared)





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