The Simmel effect and babies names

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Simulations of the Simmel effect are performed for agents in a scale-free social network. The social hierarchy of an agent is determined by the degree of her node. Particular features, once selected by a highly connected agent, become common in lower class but soon fall out of fashion and extinct. Numerical results reflect the dynamics of frequency of American babies names in 1880-2011.

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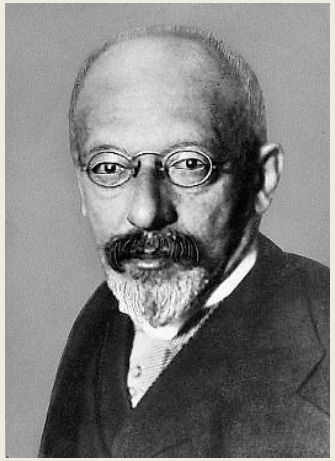
outline

- What is the Simmel effect?
- Why scale-free networks?
- Why names?
- Algorithm of Pedone and Conte
- Numerical results
- More on names
- Conclusions

Georg Simmel, Fashion, *International Quarterly 10 (1904) 130*



What is the Simmel effect?

… agents are not only inclined to follow but also to distinguish themselves from others. (Simmel) described fashion as a combined effect of both attitudes. (…) When social groups are ordered by rank, agents imitate symbols designating the higher hierarchical levels and abandon those designating the lower level ones. As a consequence of this dynamic, the status symbols will rapidly spread through the population, proceeding downward from the higher to the lower levels of the social hierarchy. However, as soon as they spread, these symbols will be abandoned and replaced with new ones.

[Roberto Pedone and Rosaria Conte, Soc. Sci. Comp. Rev. 2001]

Why scale-free networks ?

- *Some* social networks *are* scale-free [Newman, SIAM 2003; Fu e a, Phys A 2008]
- Degree is a convenient measure of social status

„The degree of an actor is important; thus, a centrality measure for an individual actor should be the degree of the node."

[Wasserman & Faust, Social Network Analysis 1994, p. 178]

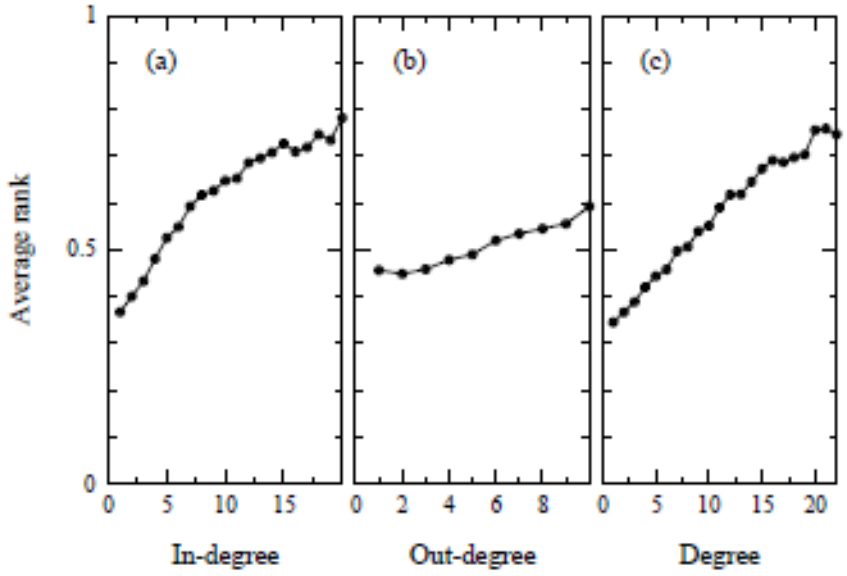
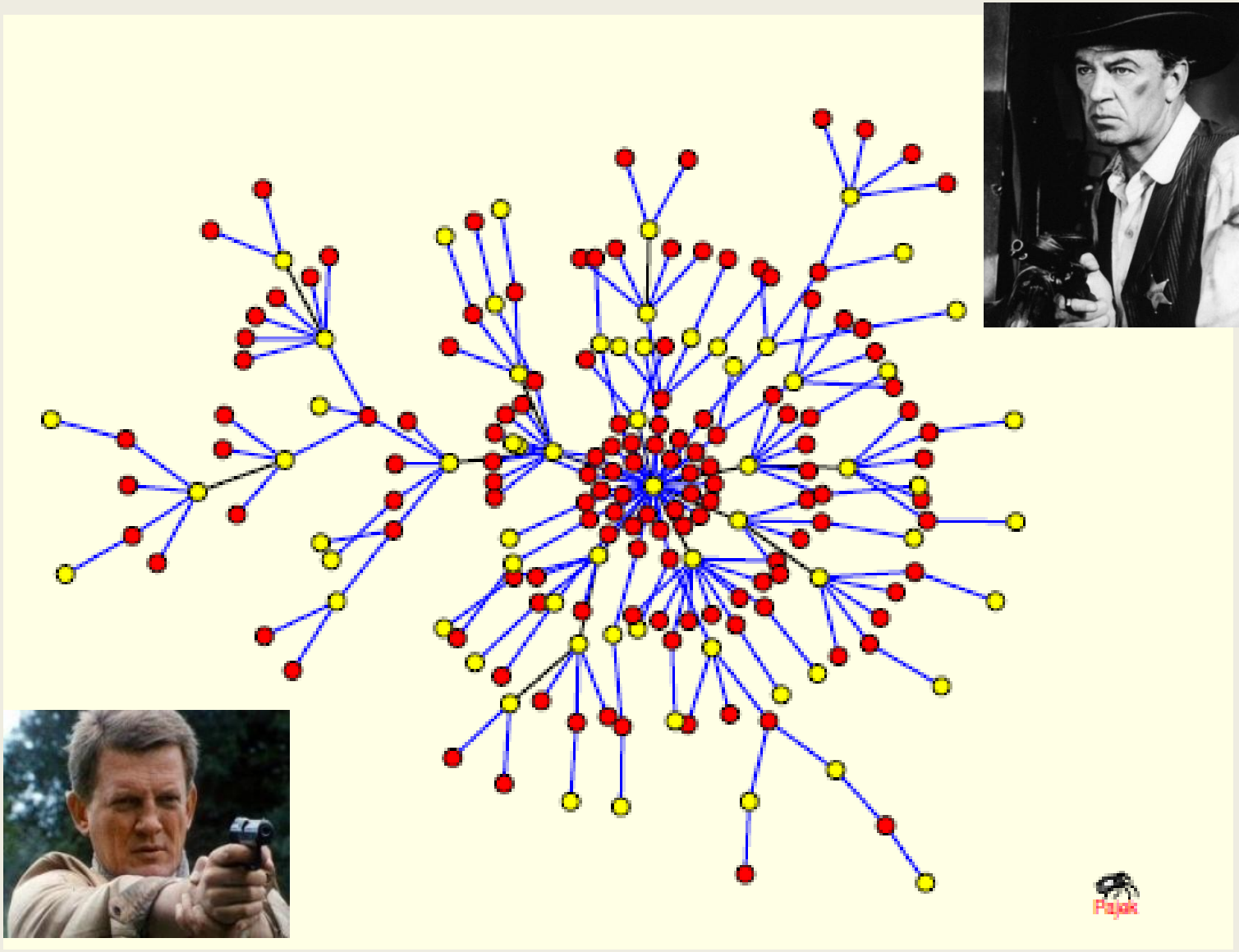


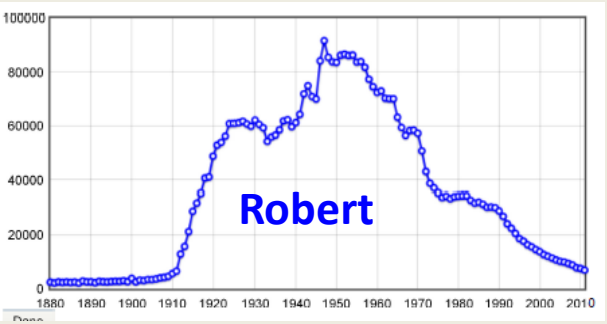
FIG. 4: Plots of rescaled rank versus degree, averaged over all individuals in all networks for (a) in-degree, (b) out-degree, and (c) the sum of degrees. Measurement errors are comparable with or smaller than the sizes of the data points and are not shown.

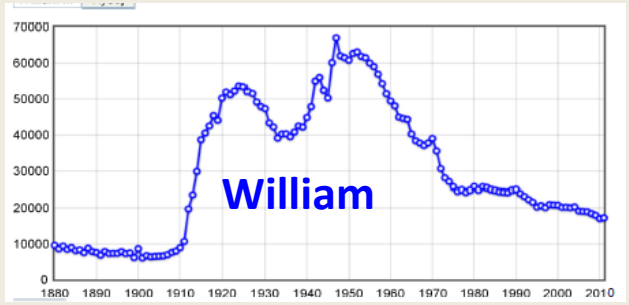
[Ball & Newman, arXiv:1205.6822]

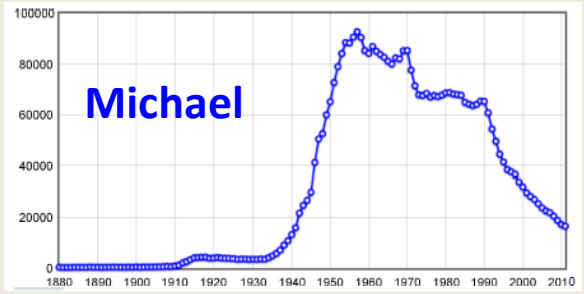


Order of imitation in a scale-free network

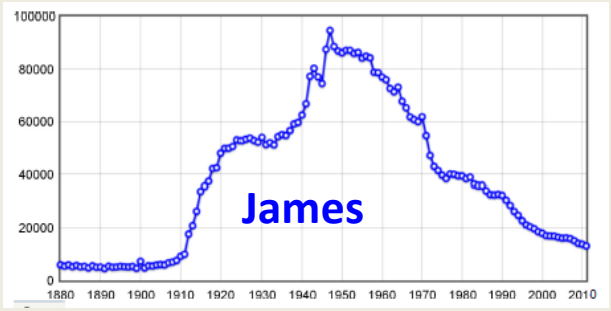
Why names ?

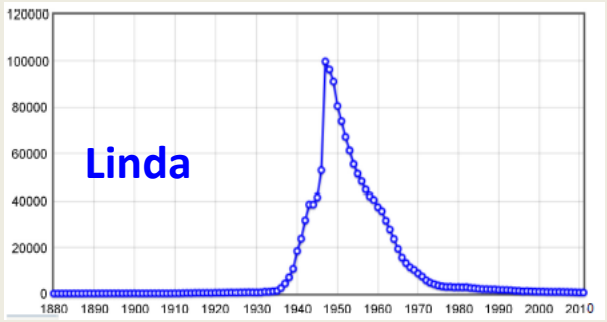


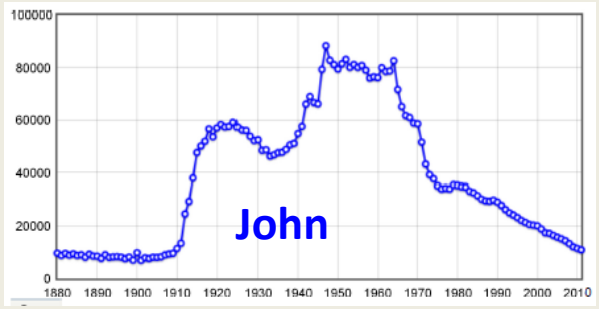


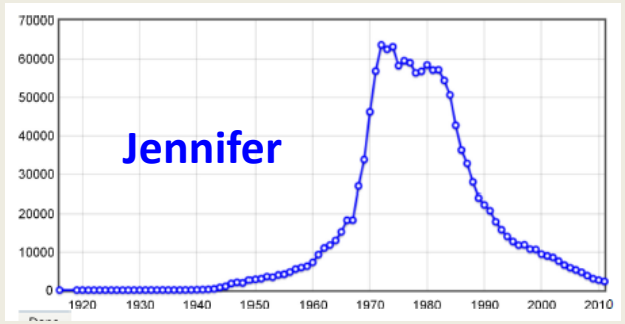


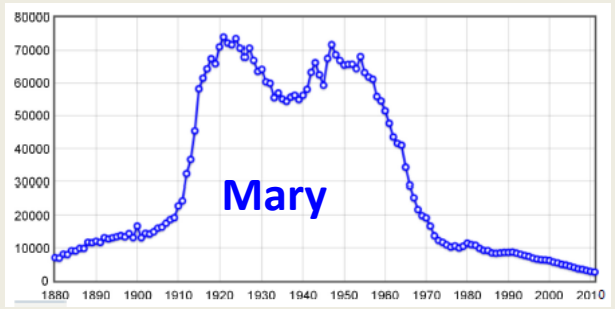
TOP 10 NAMES

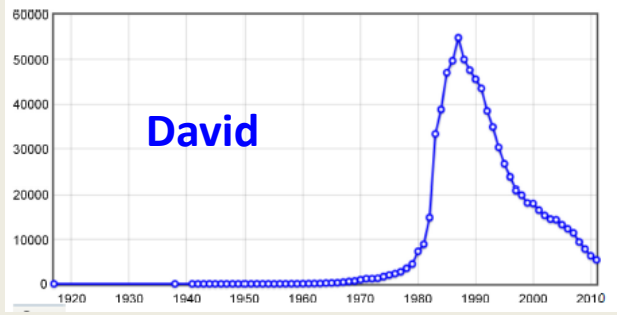


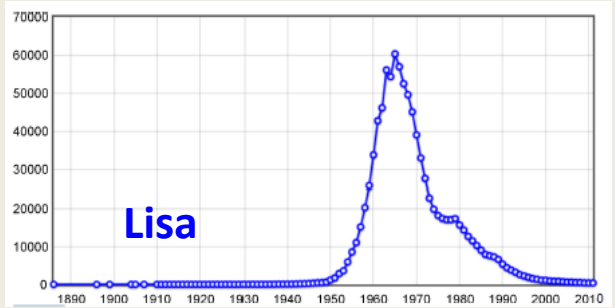












[The Official Website of the U. S. Social Security Administration (www.ssa.gov)]

A glance back

- Numerical calculations of variability and standard deviation of the distribution of the status symbols in four different schemes of calculation [1]
- Fitting of the frequency of names against rank, combined Beta function and power law [2]
- Simulations of name frequency as an activation-inhibition processes, lambda-shape of peaks of popularity [3]
- A model of personalized selection of names, two regimes in the Zipf law [4]
- Data analysis: fragmentation vs time [4]

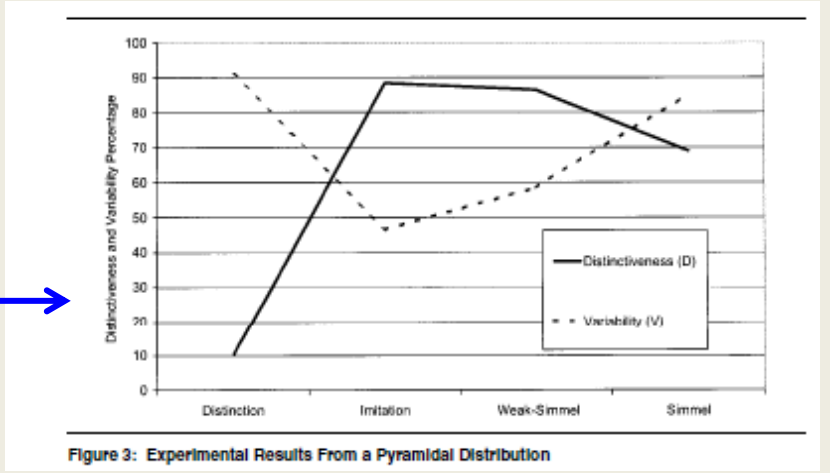
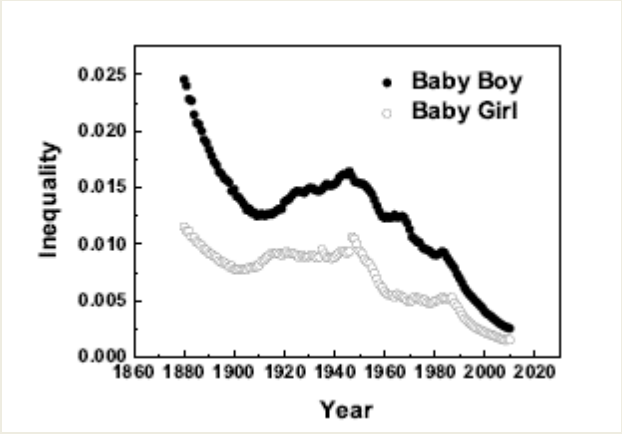


Figure 3: Experimental Results From a Pyramidal Distribution



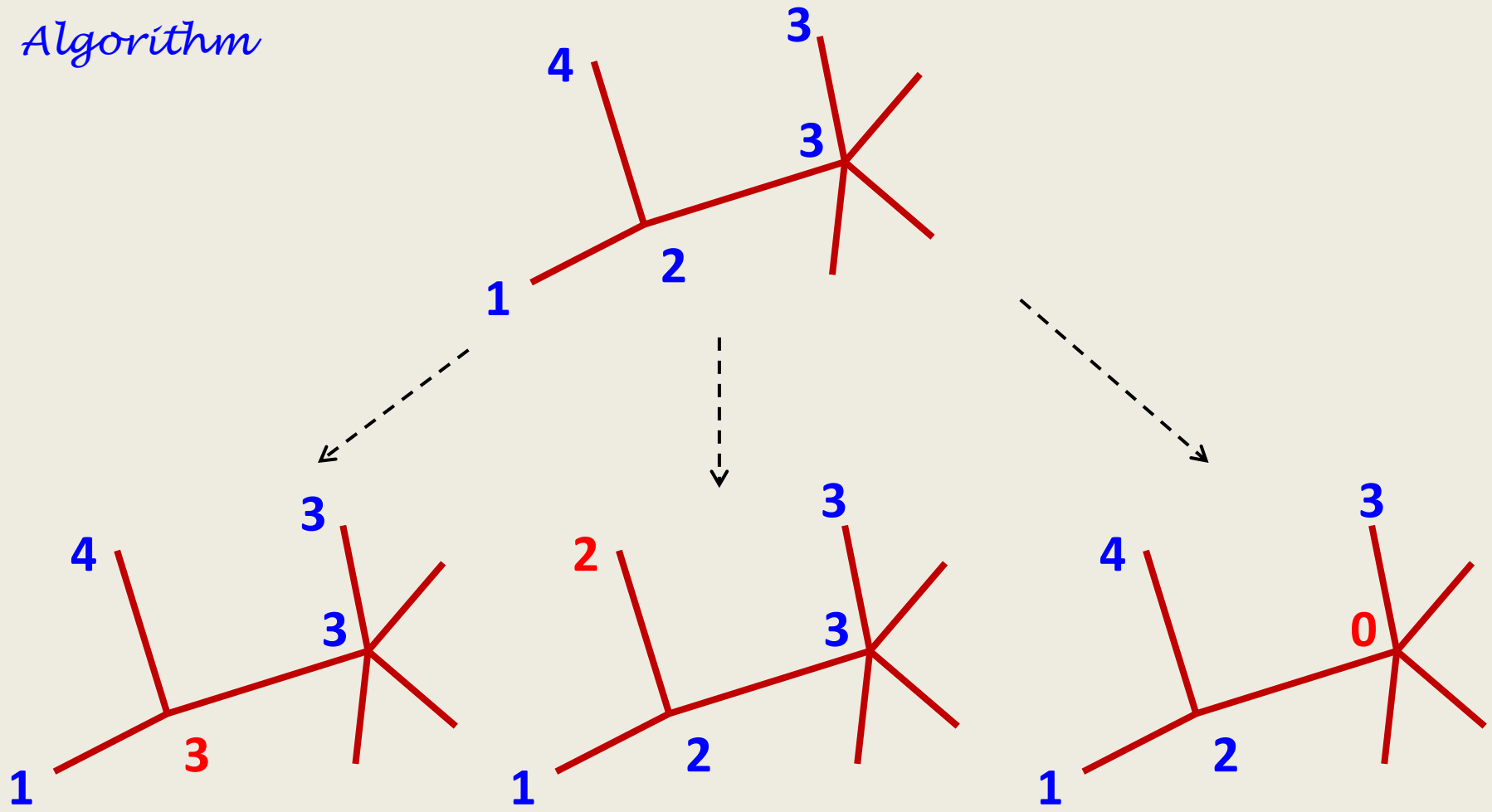
[1] R. Pedone, R. Conte, Dynamics of Status Symbols and Social Complexity, Social Science Computer Review 19 (2001) 249

[2] Wentian Li, Analyses of baby name popularity distribution in U.S. for the last 131 years, Complexity 18 (2012) 44

[3] D. H. Zanette, Dynamics of fashion: The case of given names, (arXiv:1208.0576).

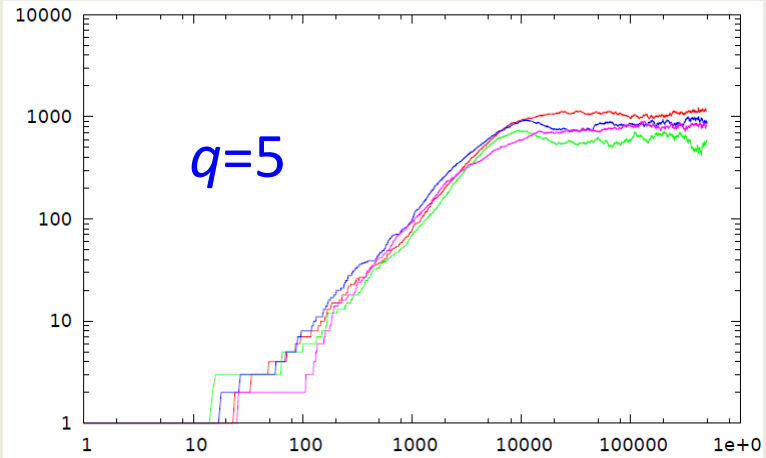
[4] N. Xi, Z.-K. Zhang and Y.-C. Zhang, Cultural evolution and personalization, (arXiv:1212.0217).

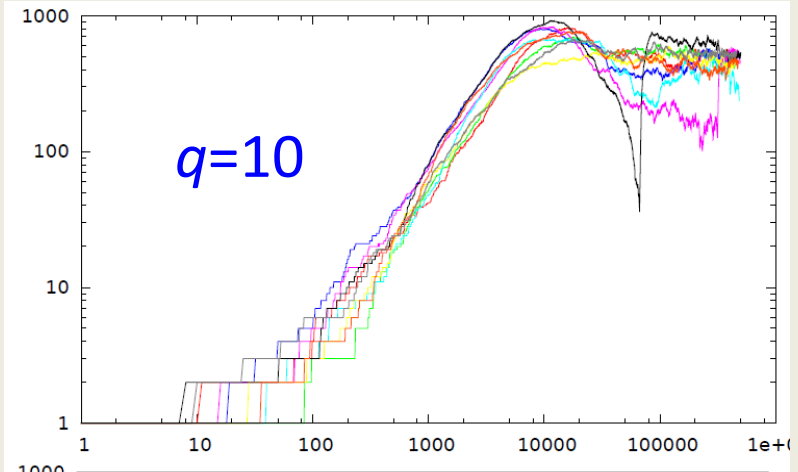
Algorithm



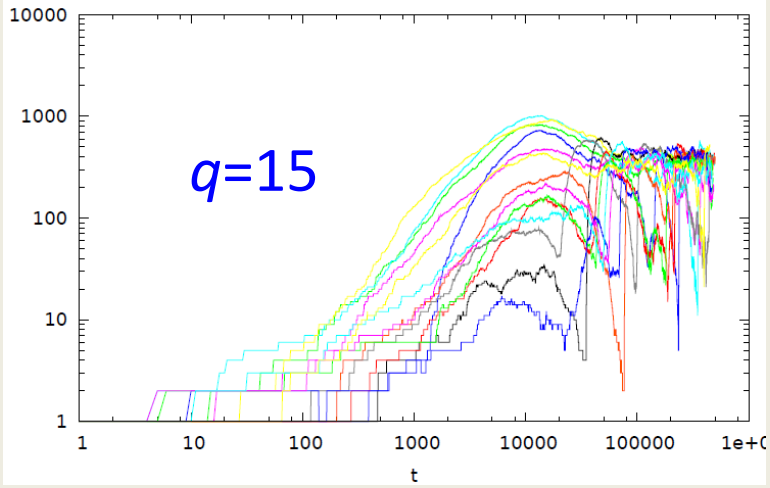
(a crib for me only)
A variable x(i) is assigned to each node. The values of these variables belong to the set 1, 2, ..., q. In the initial state x(i)= 1 for all nodes. For each node i, its neighbours are divided into two sets: those with degree larger or equal to the degree of i form the set {i+}, and the remaining neighbours- the set {i-}. A node k which has no neighbours in {k+} is marked as a local hub (LH). During the simulation, nodes are selected randomly. For the selected node, say j, states of the set {j+} are classified as estimable, and states of the set {j-} are classified as shaming. If a state (a number y within the allowed range 1, ..., q) exists which is simultaneously estimable and not shaming, it is classified as legal. Then we substitute x(j) = y. For LHs, all states are estimable. If more legal states exist, x(j) takes the value which is most frequent in {j+}. If no legal states exist for j, x(j) remain unchanged. For LHs, the legal state is chosen randomly.

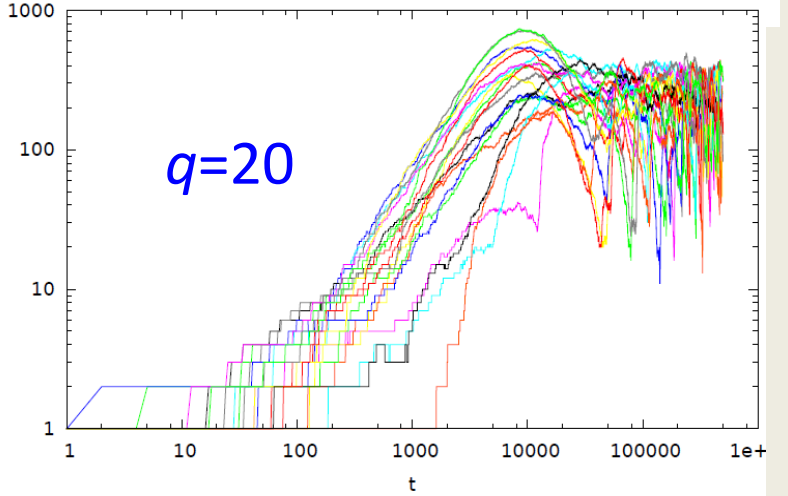
Numerical results

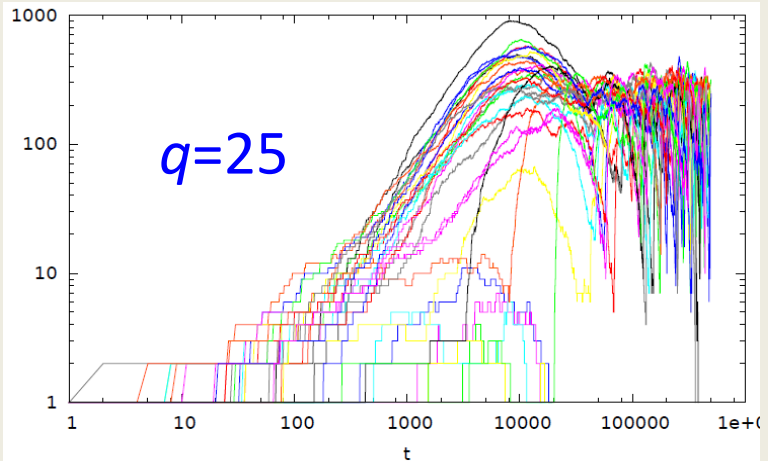


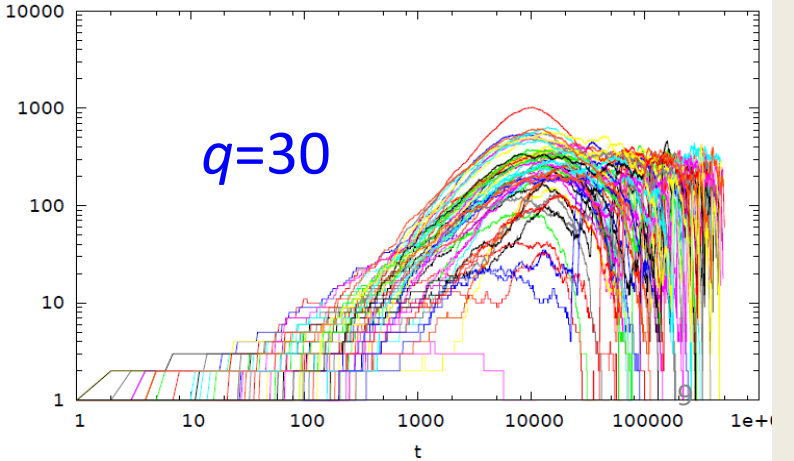


As the number *q* of options increases, particular symbols start to die out.

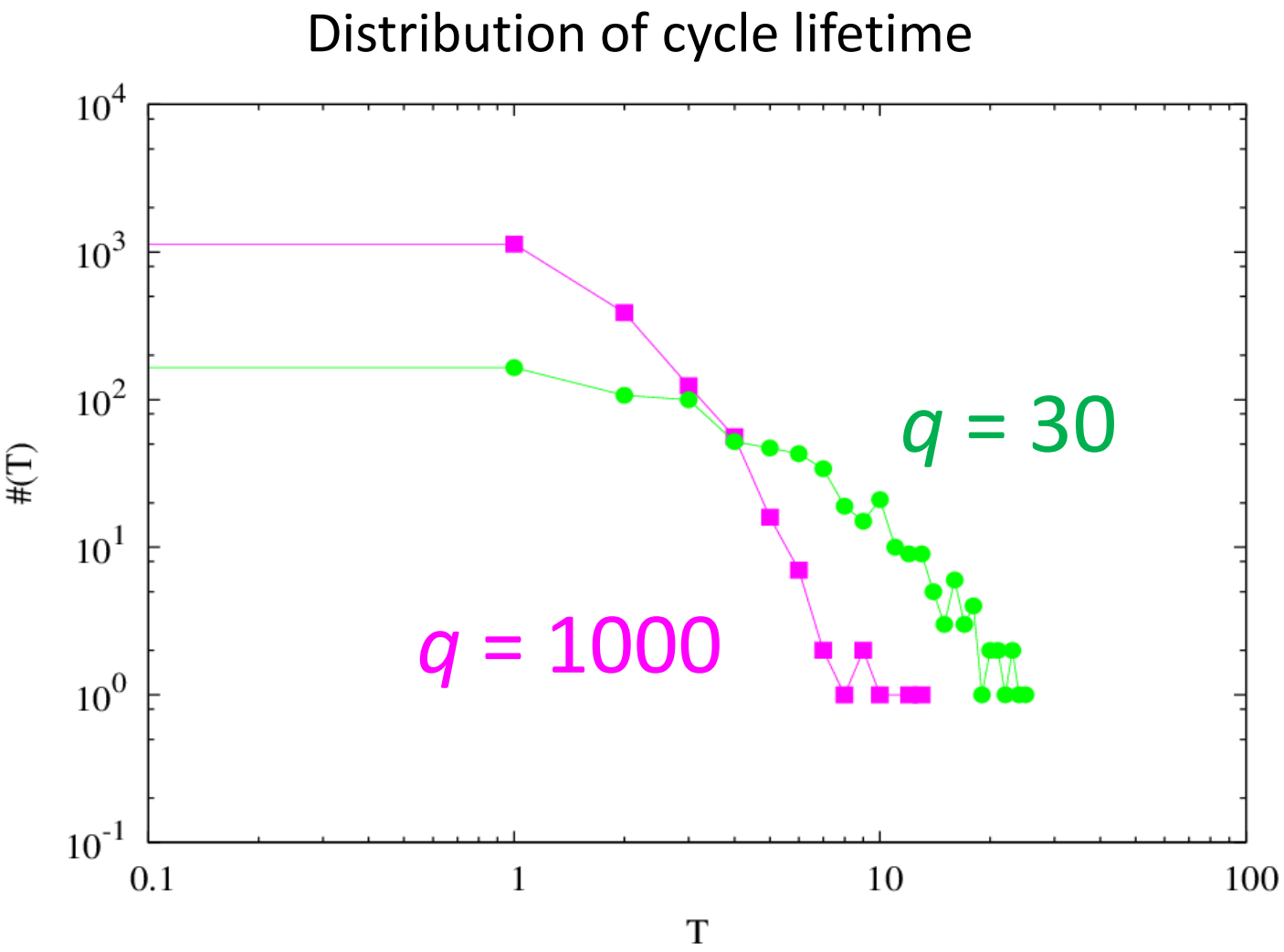




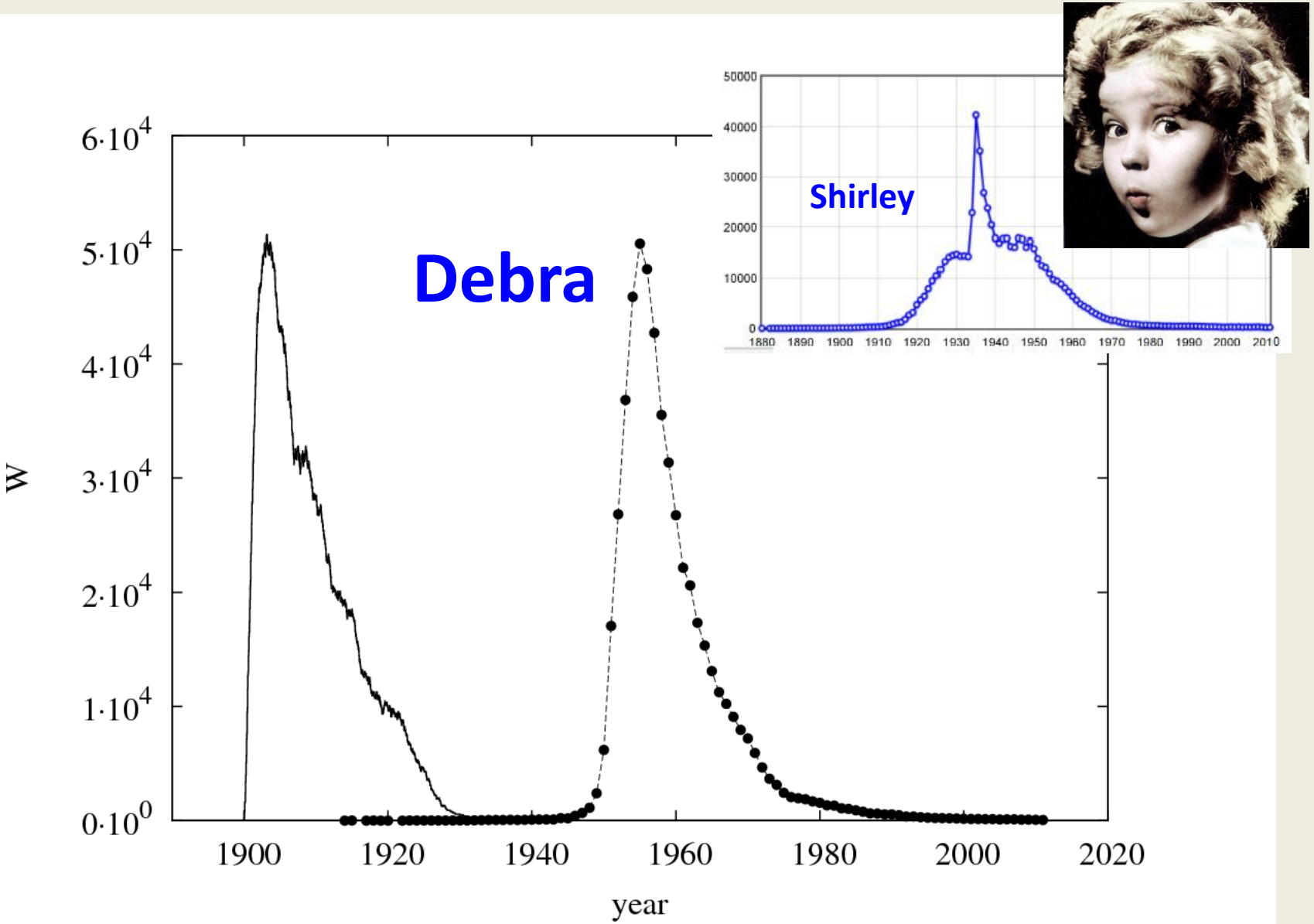




Numerical results



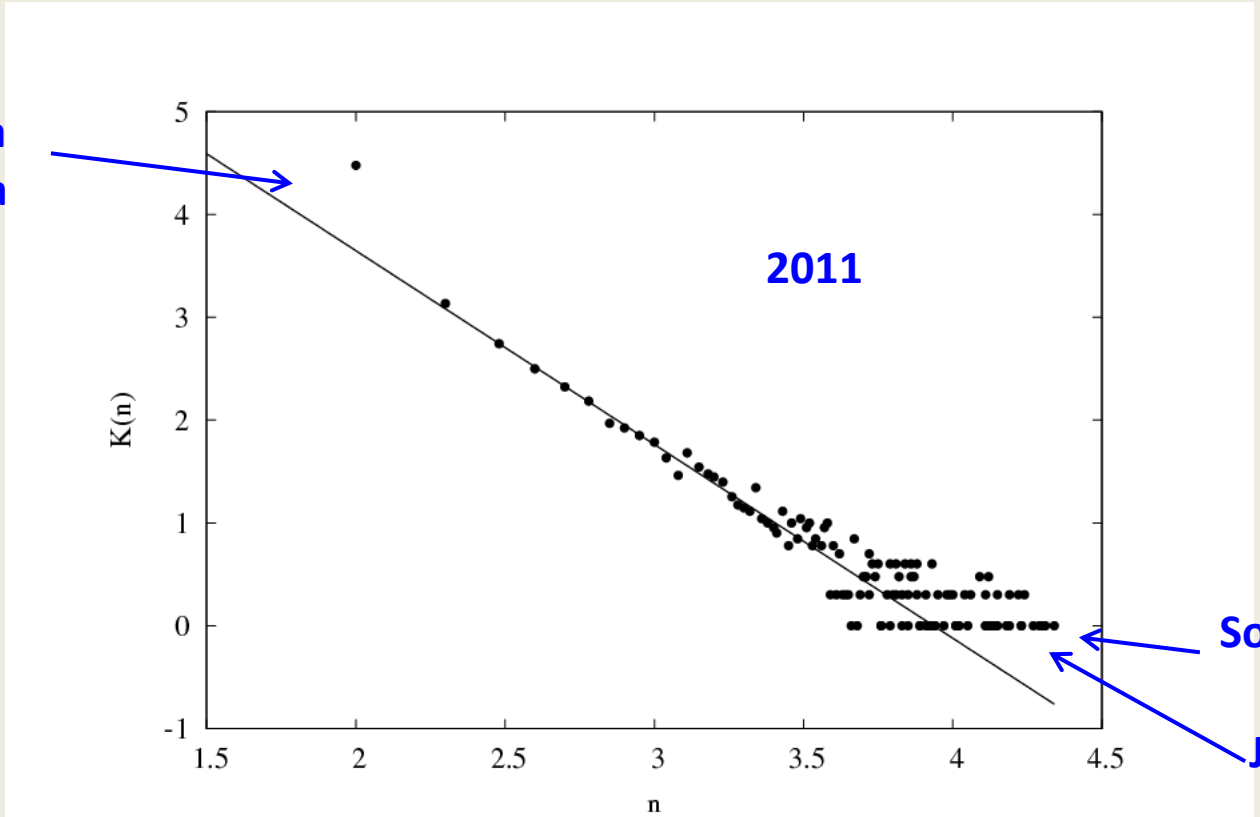
Data and numerical results - the lambda shape



The data - frequency distribution

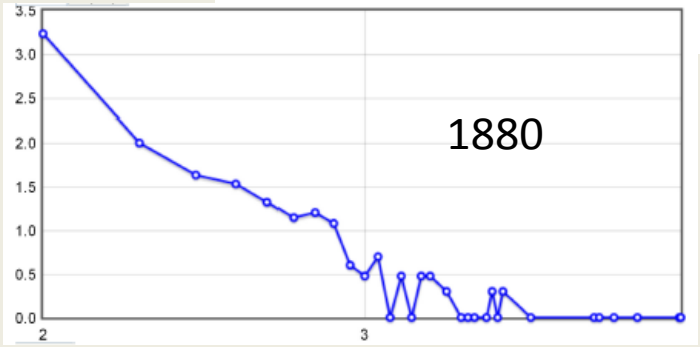
Histogram of frequencies of babies names

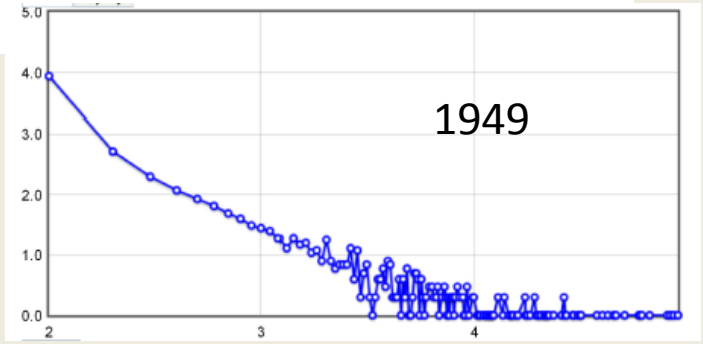
Aadhya
Aaditya
…



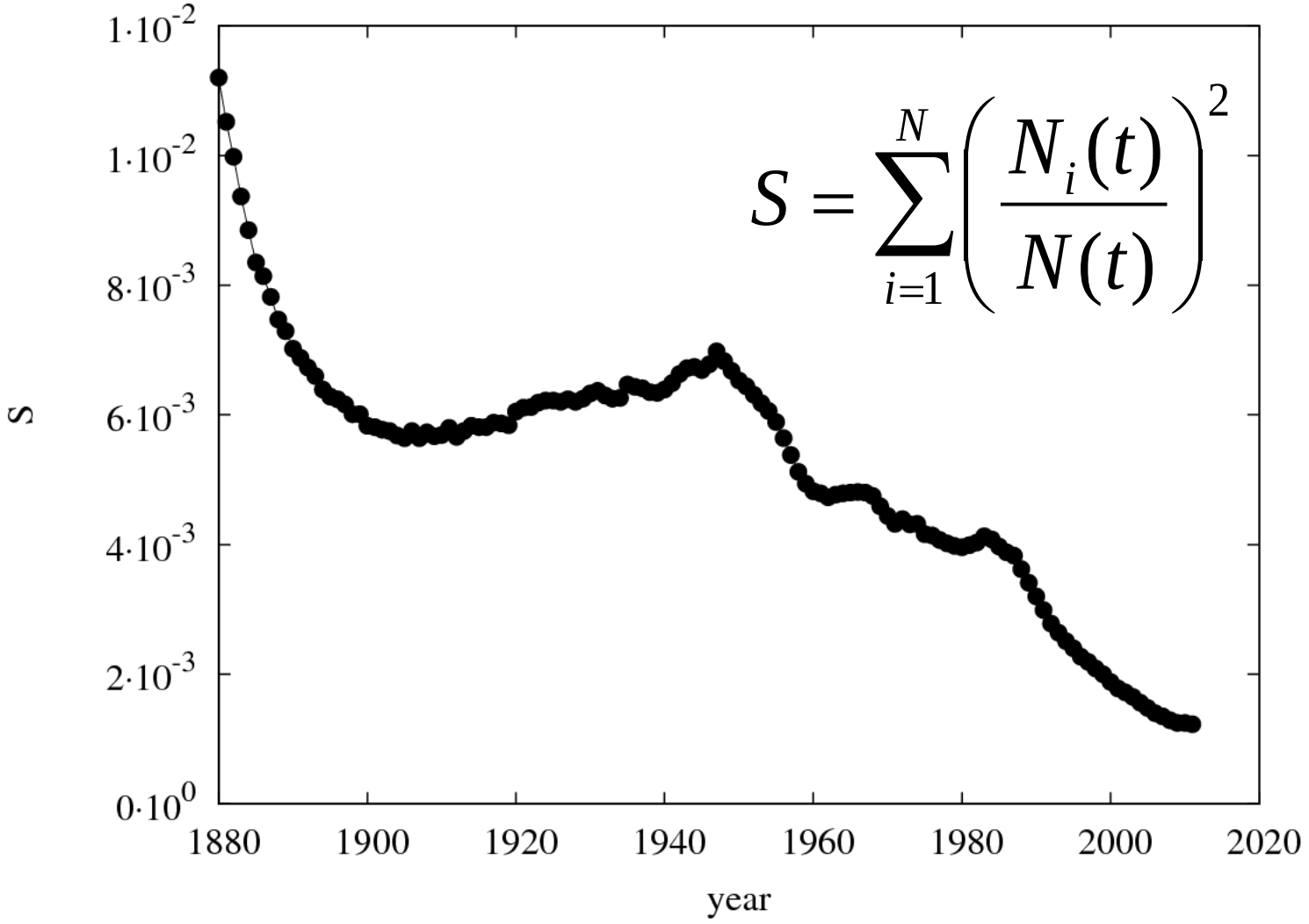
Sophia

Jacob



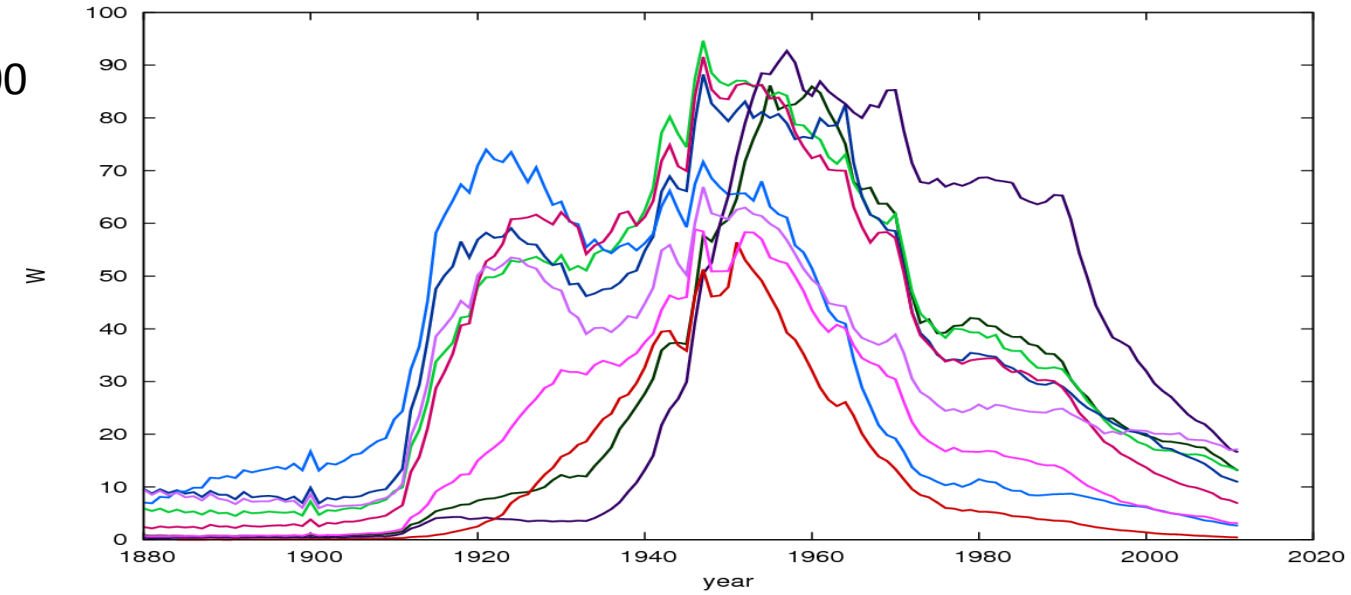


Fragmentation $S(t)$

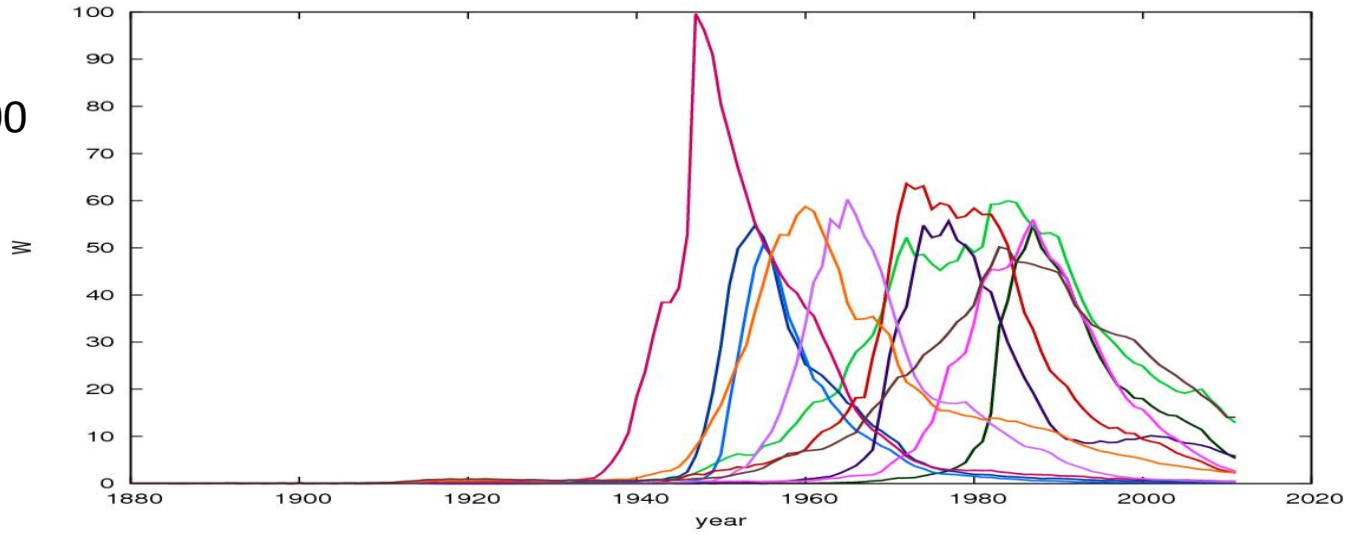


The data - top 20 names

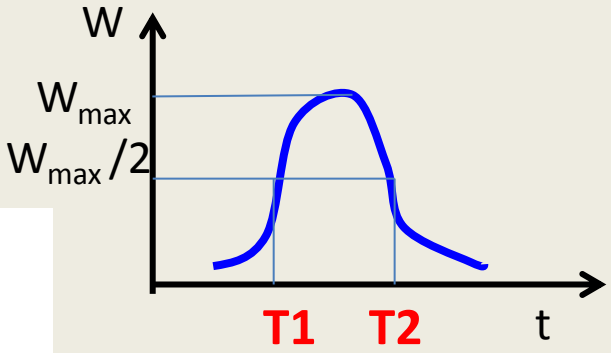
$W(1935) > 2000$



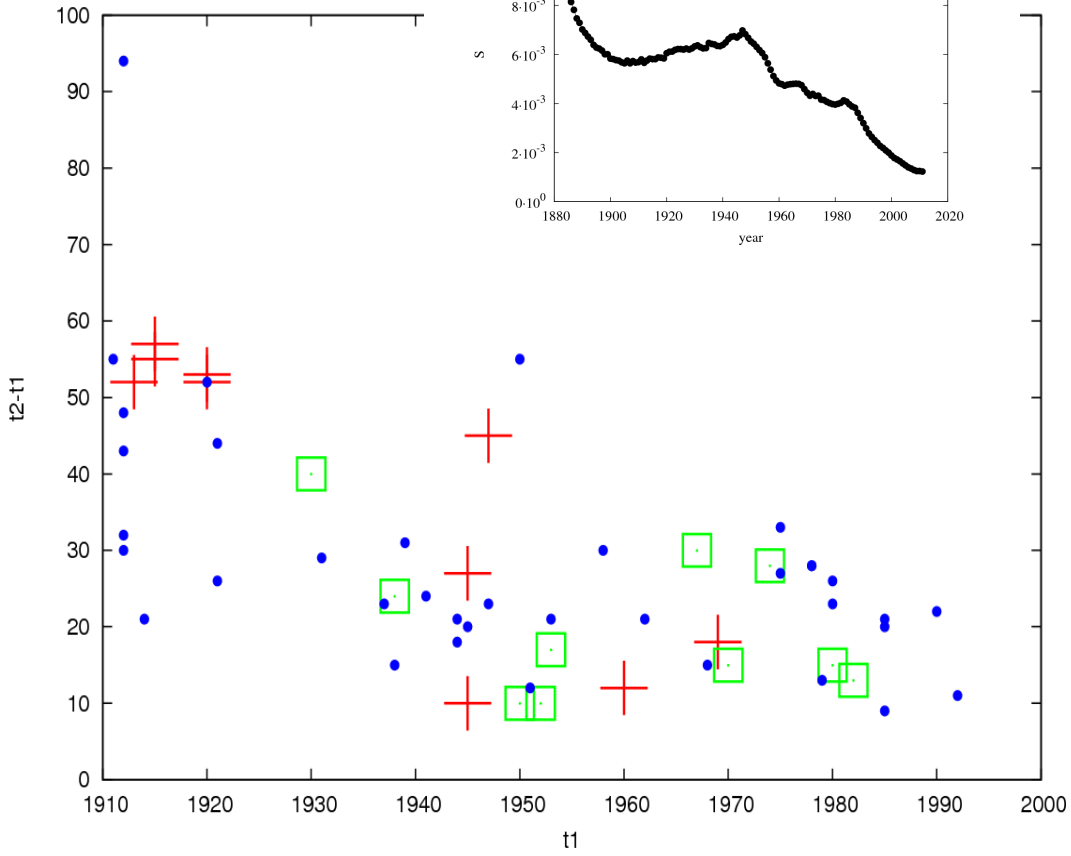
$W(1935) < 2000$



The data : does the cycle length decrease ?



T2-T1



red crosses : max $\in$ 60-100 $\times10^3$
green squares : 50-60 $\times10^3$
blue dots : 25-50 $\times10^3$

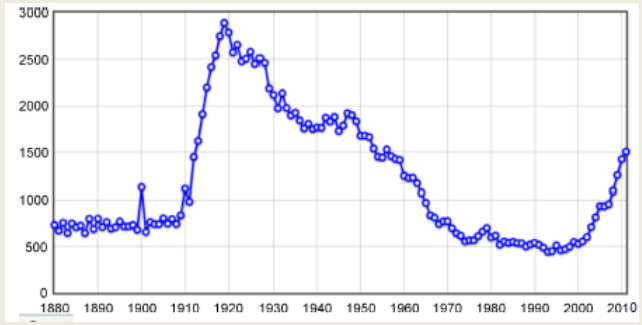
T1

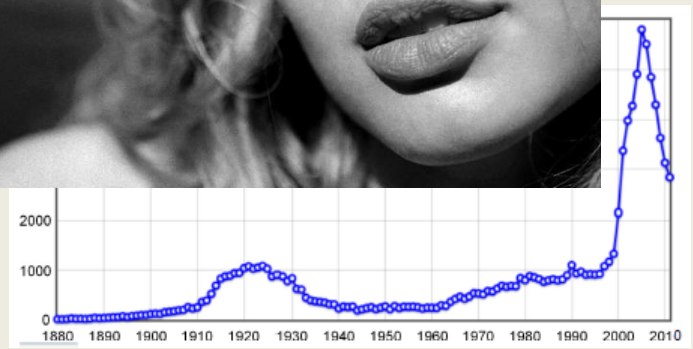
Conclusions

The model of the Simmel effect proposed by Pedone and Conte is applied to a scale-free network, where the node degree is assumed to play the role of the social status. The model reproduces the following stylized facts on American babies names in 1880-2011:

1. Popularities of most names increase, then decrease more slowly.
2. The half-band widths of these maxima are negatively correlated with the names diversity.

A note: for tens of years, elites are dictated by media.


3000
2500
2000
1500
1000
500
0
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

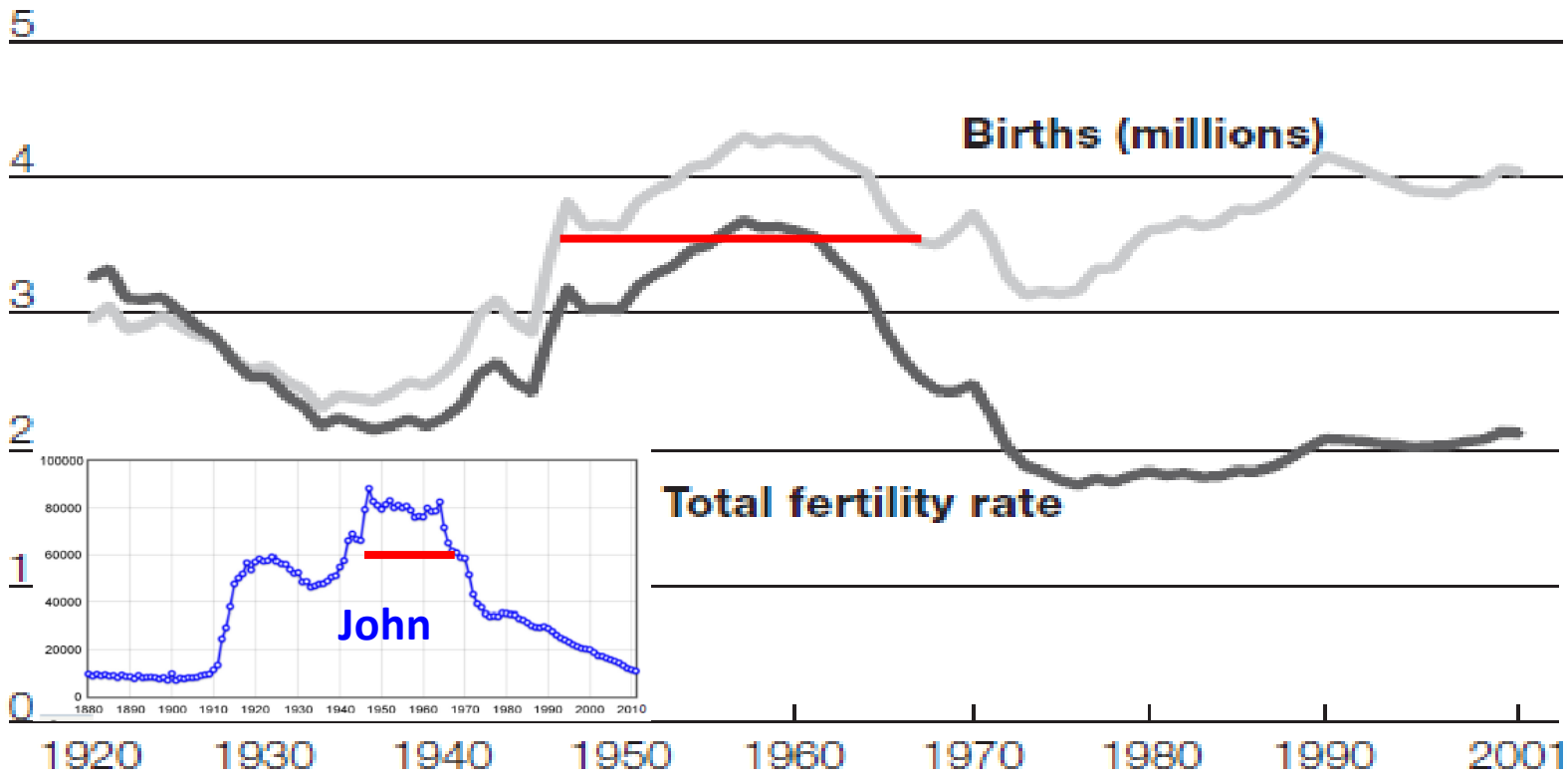

2000
1000
0
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

0
1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

Supplement : The birth rate in USA (Wiki)

Figure 2

U.S. Births and Total Fertility Rate, 1920–2001



Note: The total fertility rate is the average total number of children born per woman given current birth rates.

Sources: R. Heuser, *Fertility Tables for Birth Cohorts by Color: United States 1901–1973* (1976); National Center for Health Statistics, *Vital Statistics of the United States, 1969*, vol. I, Natality (1974); and J.A. Martin, M.M. Park, and P.D. Sutton, *National Vital Statistics Report* 50, no. 10 (2002): table 5.