



Statistical Laws Governing Fluctuations in Word Use from Word Birth to Word Death

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We analyze the dynamic properties of 10^7 words recorded in English, Spanish and Hebrew over the period 1800--2008 in order to gain insight into the coevolution of language and culture. We report language independent patterns useful as benchmarks for theoretical models of language evolution. A significantly decreasing (increasing) trend in the birth (death) rate of words indicates a recent shift in the selection laws governing word use. For new words, we observe a peak in the growth-rate fluctuations around 40 years after introduction, consistent with the typical entry time into standard dictionaries and the human generational timescale. Pronounced changes in the dynamics of language during periods of war shows that word correlations, occurring across time and between words, are largely influenced by coevolutionary social, technological, and political factors. We quantify cultural memory by analyzing the long-term correlations in the use of individual words using detrended fluctuation analysis.

Comments: Version 1: 31 pages, 17 figures, 3 tables. Version 2 is streamlined, eliminates substantial material and incorporates referee comments: 19 pages, 14 figures, 3 tables

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