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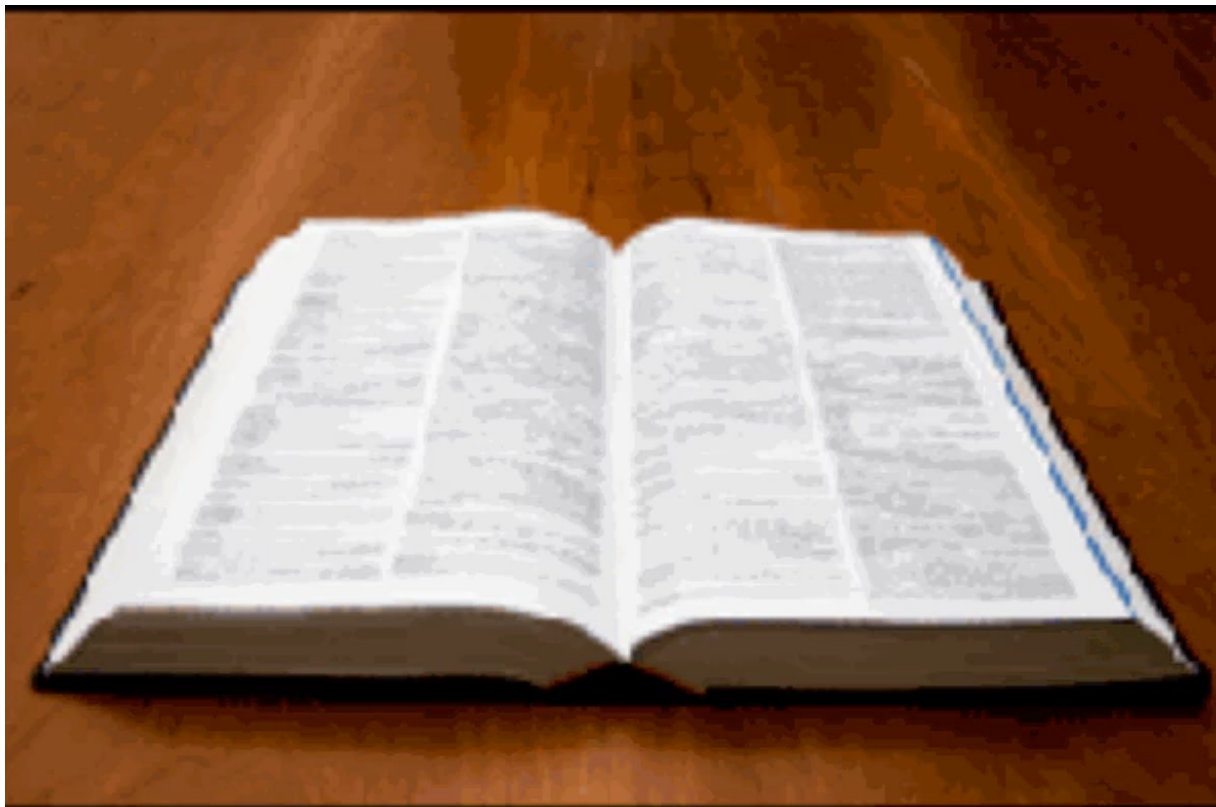
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EVOLUTION

## Use It or Lose It: Why Language Changes over Time

More commonly used words are the least likely to evolve

By Nikhil Swaminathan on October 10, 2007



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The words used the most in everyday language are the ones evolving at the slowest rate, say two new studies published in *Nature*.

In one paper, researchers at Harvard University focused on the evolution of English verb conjugations over a 1,200-year period. In a separate study, a team at the University of Reading in England reviewed cognates (similar sounding words in

different languages for the same object or meaning, such as "water" and the German "*wasser*") to determine how all Indo-European tongues progressed from a common

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"What our frequency effect allows us to do is identify...ultraconserved linguistic elements," says [Mark Pagel](#), an evolutionary biology professor at Reading, about his research. "Namely, they're the words we use all the time."

In their search for cognates, Pagel and his team examined some 200 words in 87 Indo-European languages, including those for "water," "two," "to die" and "where." The number of distinct classes of cognates for each word ranged from one (indicating all the words sound similar) for frequently used concepts such as numbers to as many as 46 different basic sounds to describe a single entity such as a bird. The word for the number three in all Indo-European languages, for instance, is similar to the English version: from *tres* in Spanish to *drei* in German to the Hindi *theen*. In contrast, the word for bird has several different sounds associated with it like *pajaro* in Spanish and *oiseau* in French.

The researchers then narrowed their focus to the frequency of use of each of the words in just four Indo-European languages—English, Spanish, Greek and Russian. Pagel says the team found that they were used at similar rates across the board even if the words with the same meaning were not cognates. "The high frequency words in Spanish are the same as the high frequency English," he says. "That [indicated] that we could come up with a kind of Indo-European frequency of use."

By combining their data, the researchers determined that it would take as little as 750 years to replace less-used words and up to 10,000 years for new words to evolve in place of the most frequently used ones.

The Harvard researchers specifically studied the roots of English, tracing verb conjugations in the language from the time of *Beowulf* 1,200 years ago through Shakespeare in the 16th century to its current form. Over the years, several past tense forms of verbs have died out in English and now only one persists as a rule: adding "-ed" to the end of verbs. (Verbs that end in "-ed" in their past tense form "regular verbs" in modern English.)

Researchers scoured grammatical texts dating back to the days of Old English,

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"smote" in Old English but since has become "smited," and "slink," which is now "slinked" but 1,200 years ago was "slunk." They located 177 verbs that were irregular in Old English and 145 that were still irregular in Middle English; today, only 98 of the 177 verbs have not been "regularized."

After calculating the frequency of use of each of the 177 irregular Old English verbs, researchers determined that the words that evolved most quickly into regular conjugational forms were used significantly less than those that went unchanged over time. In fact, their statistical analysis determined that given two verbs, if one was used 100 times less frequently than the other, it would evolve 10 times faster than the verb employed more often. They predict the next verb to fall into line will be wed, the past tense of which will regularize from wed to wedded.

By being more frequent, a verb is more stable," says study co-author Erez Lieberman, a graduate student in applied mathematics at Harvard University. He adds that both the Harvard and Reading papers lay out a case for a version of natural selection that acts on linguistic evolution and mirrors biological evolution. "Both studies," he says, "illustrate this profound effect that frequency has in the survival of a word."

Partha Niyogi, author of the book *The Computational Nature of Language Learning and Evolution* and a professor of computer science and statistics at the University of Chicago, says these empirical findings are consistent with theoretical models on the lexical evolution. "Languages are constantly changing," he notes. "In biological evolution that fact has been given a lot of attention, but the fact is that in languages this is happening all the time, [as well]. Darwin in [*The Descent of Man*] commented that languages were evolving over time, and it was just like speciation."

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