**The Future of Language**
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# The Future of Language

David Graddol*

**The world's language system is undergoing rapid change because of demographic trends, new technology, and international communication. These changes will affect both written and spoken communication. English may not be the dominant language of the future, and the need to be multilingual will be enhanced. Although many languages are going extinct, new ones are emerging in cities and extended social groups.**

We are living through an extraordinary moment of linguistic history. The world's language system, having evolved over centuries, has reached a point of crisis and is now rapidly restructuring. We will experience some decades of rapid, and perhaps disorienting change, after which a new linguistic world order will emerge. Precise predictions may be difficult, but the general shape of things to come is clear (*1*).

## The Demographic Future

Global demography is one cause of the language crisis. The world's population rose rapidly during the 20th century, but the major increase took place in less developed countries. This trend, decade on decade, is transforming the global "league table" of languages, as based on native speaker numbers. The "top 10" languages at the end of the 20th century (Table 1) are not representative of the estimated usage of young people in 2050 (Table 2).

Estimating native speaker numbers for the larger—and otherwise best documented—languages such as English is surprisingly difficult. The numbers provided in Tables 1 and 2 are based on United Nations population projections and estimates of the linguistic demography of each country—a technique that is approximate but that allows principled projections of future language usage.

One perhaps unexpected trend is a relative decline of English, as projected in Fig. 1. In the mid-20th century, nearly 9% of the global population grew up speaking English as their first language, but that proportion is declining—toward nearer 5% by 2050 (*2*).

Chinese (whether one counts only Mandarin or all Chinese dialects, which share a common writing system) is well established as the world's largest language (in terms of native speakers), and its position will remain unchallenged. The next four major languages, however, are gradually converging and are likely to be equally ranked by 2050, with Arabic rising as English declines. But the combined "market share" of these larger languages taken together is unlikely to change much over the coming decades. It is the languages of the next rank—such as Bengali, Tamil, and Malay—which are growing most rapidly.

## The Future of Diversity

While a few languages compete for position at the top of the world hierarchy, there is devastation at the base. Most linguists agree that roughly 6000 languages exist in the world today. Yet 90% of these may be doomed to extinction, with much of this loss happening in the coming century. We may now be losing a language every day.

Public awareness of such language loss will grow, as will an appreciation of its wider implications. Regret at the passing of quaint and linguistically interesting languages may be replaced by concern about their strategic and economic importance. In 2001 the United Nations Environmental Programme (UNEP) concluded that "Losing a language and its cultural context is like burning a unique reference book of the natural world" and linked indigenous languages with "a vital understanding of sustainable land management and of cultivation practices which exploit diversity (*3*)."

However, while we lose older, rural languages, new urban hybrid forms may help maintain global diversity. Cities are places where languages mingle and where language change speeds up. And the fast growing urban areas of the world are breeding grounds for new hybrid languages—just as hundreds of new forms of English have already been spawned around the world (*4*).

Paradoxically, cities of the future will also allow immigrant languages to survive. Ethnic minorities often now belong to diasporic communities, within which members travel, watch the same films and satellite television channels, and communicate daily by telephone or e-mail. Everywhere, the social identities and networks that languages reflect and construct are becoming dispersed and less geographically tied. We can expect the continued decline of traditional geographically based dialects.

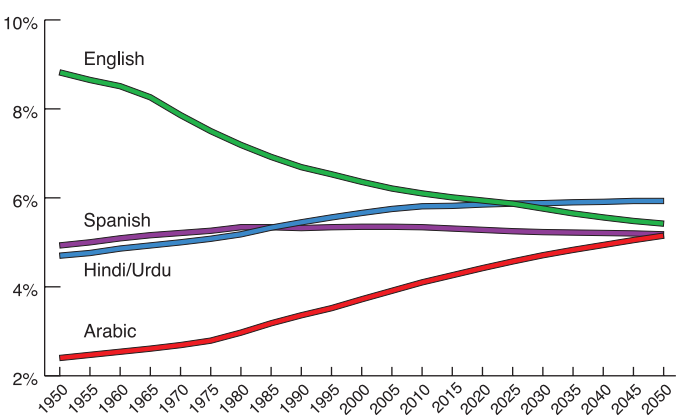


**Fig. 1.** The changing percentage of the world's population speaking English, Spanish, Hindi/Urdu, and Arabic.

## The End of Modern Languages

Many of these trends will challenge our sense of what is normal in language matters, shaped as it has been by a centuries-long experience of modernity. Modernity arose from complex historical factors including the emergence of sovereign nation states, capitalist societies, the protestant reformation in northern Europe, and the development of printing, which disseminated identical copies of standard texts. Modernity also gave us "modern languages," each a national language that has benefited from centuries of development in its grammatical and lexical resources.

In English, for example, the "national language project" began with literature in the 16th century (poets and dramatists such as Dryden and Shakespeare attempted to remedy the defects of English as compared with Latin and Greek); science was added in the 17th century (Sir Isaac Newton published first in Latin, later in English); dictionaries and grammars were created in the 18th century (Samuel Johnson); and the 19th century brought corporate affairs, modern advertis-

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**Table 1.** Estimates of numbers of native speakers globally in 1995 for the top 10 languages (*1*).

| Language | No. of native speakers (millions) |
|---|---|
| 1. Chinese | 1113 |
| 2. English | 372 |
| 3. Hindi/Urdu | 316 |
| 4. Spanish | 304 |
| 5. Arabic | 201 |
| 6. Portuguese | 165 |
| 7. Russian | 155 |
| 8. Bengali | 125 |
| 9. Japanese | 123 |
| 10. German | 102 |

ing, international diplomacy, and many other new forms of communication (*5*).

But the whole modernity project may now be unraveling, taking us into new linguistic landscapes. The "old" national languages are losing functionality as much communication—economic, cultural, and political—becomes international. Swedish, like many smaller European languages, is now positioned more as a local language of solidarity than one for science, university education, or European communication.

Big languages like English, meanwhile, have lost armies of linguistic gatekeepers who used to ensure that only the language of a social elite—sanitized by copy editors—reached public consumption. A combination of new technology, new skills [anyone can print a magazine or publish a blog (Web log)], changing public attitudes to correctness, and economics of publication (most copy editors are now freelance) have led to "destandardization." Written language now much more closely reflects the norms of speech. Dictionaries include the latest slang expressions because they appear in newspapers. Is e-mail best thought of as spoken language written down? Or as a new kind of informal writing?

## A Multilingual Future

Any look into the future must entertain the idea that soon the entire world will speak English. Many believe English will become the world language to the exclusion of all others. But this idea, which first took root in the 19th century, is past its sell-by date. English will indeed play a crucial role in shaping the new world linguistic order, but its major impact will be in creating new generations of bilingual and multilingual speakers across the world.

The growth of Spanish in the United States can be understood as part of a much wider global trend toward bilingualism. In Europe, a wave of English has spread from North to South (*6*). In Sweden, Denmark, and Netherlands, nearly 80% of the population now claim fluency in the language (Fig. 2); France is a state of transition; in Italy, Spain, Greece, and Portugal, learning English is now big business. Indeed, students and employees may be assumed to speak English—it is regarded as a basic skill taught in elementary school alongside computer skills. Employers in parts of Asia are already looking beyond English—in the next decade, the new "must-learn" language is likely to be Mandarin.

The spread of English and other major languages beyond their traditional territories has eroded the idea that "one country, one language" is the norm. In the new world order, most people will speak more than one language and will switch between languages for routine tasks. Monolingual English speakers may find it difficult to fully participate in a multilingual society. We also must think differently about what it means to speak a language, or to learn and teach it. The expectation that someone should always aspire to native speaker competence when learning a foreign language is under challenge, as is the notion of "native speaker" itself.

## Future of Grammar

Theoretical perspectives in linguistics will shift to reflect these trends. In the 19th century, scholarly study of language focused on vocabulary—particularly its historical subdiscipline known as "etymology"—and phonetics, which provided a new, laboratory-based dimension. During the 20th century, scholars became more interested in grammar—especially the problems related to word order and syntax that a language like English presented (the heavily inflected classical languages of Latin and Greek had allowed grammar to remain a branch of word study).

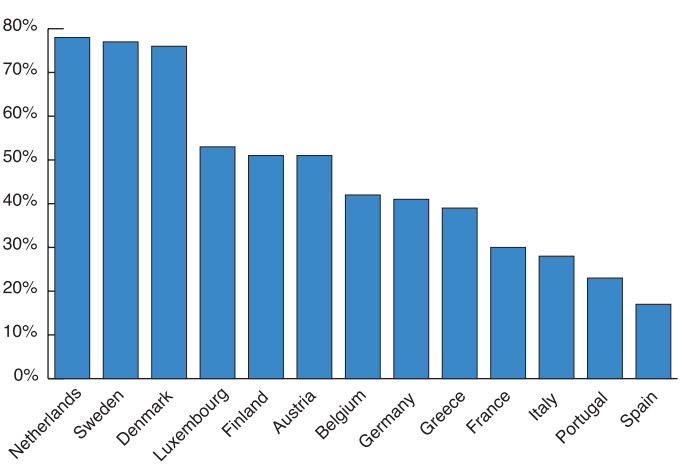


**Fig. 2.** Percentage of European Union populations claiming that they speak English (*6*).

**Table 2.** Estimates of numbers of native speakers globally aged 15 to 24 in 2050 (*1*).

| Language | No. of native speakers globally (millions) |
|---|---|
| 1. Chinese | 166.0 |
| 2. Hindi/Urdu | 73.7 |
| 3. Arabic | 72.2 |
| 4. English | 65.0 |
| 5. Spanish | 62.8 |
| 6. Portuguese | 32.5 |
| 7. Bengali | 31.6 |
| 8. Russian | 14.8 |
| 9. Japanese | 11.3 |
| 10. Malay | 10.5 |

When Noam Chomsky published his groundbreaking book on *Syntactic Structures* in 1957 (*7*), syntax became regarded as the central problem in linguistic description. But in the future, we may come to appreciate how far the Chomskyan approach has led linguists down a blind alley. Over the last half-century, theories of syntax have lost touch with language as spoken by people in the real world, and have retreated into abstract studies of universal features of human cognition.

Linguists keen to develop theories applicable to real-world problems of our age—such as in education, machine translation, information retrieval, national security, and even forensic law—have begun to exploit "data mining" techniques made possible by the power of modern computers. They have scrutinized patterns of language in huge collections of real-world texts and conversations—hundreds of millions of words at a time. Such corpus-based analysis already suggests an answer to something that has puzzled grammarians for hundreds of years: No one has ever successfully produced a comprehensive and accurate grammar of any language. In the words of the early 20th-century anthropological linguist, Edward Sapir, "all grammars leak" (*8*). Some emerging text-based grammars suggest that such an attempt is unnecessary—there need be no more endless arguments over taxonomies of subordinate clause. It seems that much of what we have expected of grammars can be better explained by focusing on words and the complex way in which they keep each other's company. Some words tend to be used as the subject rather than object of a clause, others may typically appear in prepositional phrases. The human brain is able to store experience of how words pattern, what kinds of text they appear in, what kinds of rhetorical structure will follow them.

This is the new science of collocation and colligation that illuminates how texts work.

### Future of Texts

Corpus linguists will have to work fast to keep up with the changing nature of texts. As texts become shorter, more fragmentary, and multimodal (using pictures, color, sound, kinetics as well as words), so strategies of interpretation and ways of reading will change.

A struggle is brewing too between author and reader, the producer and consumer of texts, which has many of the dimensions—political, economic, social, technological—that characterize postmodernity. On the one hand, multimodal texts need more attention by designers and editors to marshal disparate forms of information into a coherent whole. But against them is a movement—at times fundamentalist in fervor—that demands free access to "content," and argues that publishers, editors, and designers are part of a capitalist conspiracy to add cost and control access to knowledge. Digital texts may mark the death of design—which will become a matter of a reader's preference setting. But technology also gives publishers new freedom to reversion intellectual property, to make it look different to different categories of reader, and to sell text by the paragraph. The linguistic resources required to construct and interpret longer, unified texts—which collectively form institutionalized genres—may be lost in all but specialized domains such as the scientific article. Readers will be left to make sense of fragmentary, often contradictory information dispersed across different channels.

### Will the Future Understand Us?

When Thomas Sebeok, an American specialist in semiotics, was asked in the 1980s to advise on a method of communicating the whereabouts of dangerous repositories of radioactive waste to generations 10,000 years hence, he concluded that there was no secure means of transmitting such knowledge over 300 generations. Instead, he recommended putting in place a relay system which ensured that "as the information begins to decay, it should be updated" and argued that any messages written in English should be designed for only three generations ahead—that is, 100 years (*9*). This may seem a short horizon—if a linguist were faced now with a typical text from the 22nd century, he or she would be unlikely to conclude that the language has radically changed in its core vocabulary or grammar. But we might not be able to make much sense of it.

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VIEWPOINT

# Software and the Future of Programming Languages

**Alfred V. Aho**

**Although software is the key enabler of the global information infrastructure, the amount and extent of software in use in the world today are not widely understood, nor are the programming languages and paradigms that have been used to create the software. The vast size of the embedded base of existing software and the increasing costs of software maintenance, poor security, and limited functionality are posing significant challenges for the software R&D community.**

We are living in a rapidly evolving information age. Computers, networks, and information pervade modern society. Some of the components are visible: Virtually every office and home is equipped with information devices such as personal computers (PCs), printers, and network connection devices. An increasing fraction of the population is using the Internet for tasks as varied as e-mail, messaging, searching for information, entertainment, and electronic shopping. The amount of information on the Internet is measured in exabytes.

Most of the infrastructure supporting the information age, however, is not evident. Today's information appliances such as TVs, organizers, and phones contain microprocessors and other forms of embedded computer systems. Telecommunications and Internet access systems are all controlled by networked computers. Wireless networks with voice and data capabilities are found the world over.

The information age has been thrust upon society, and everyone is being affected by the new technology. The information infrastructure is creating new opportunities for improving all aspects of life from childhood to old age. But the technology is also creating new challenges, especially in areas such as the security and privacy of information systems.

### The Unappreciated Importance of Software

Few people appreciate the importance of software—until it breaks! The amount of software used by governments, companies, educational institutions, and people throughout the world is staggering. An individual system, such as a PC operating system, can consist of many tens of millions of lines of code. If we assume that there are 5 million programmers worldwide, each producing 5000 lines of new software a year (the industry average), then a conservative estimate is that the world is already using hundreds of billions of lines of software to conduct its affairs. Assuming that it costs somewhere between $10 and $100 to produce a line of working software, we see that the worldwide investment in software is in the trillions of dollars. A software system requiring tens of millions of lines of code would cost hundreds of millions of dollars to develop from scratch. The high cost of new software development is one of the principal drivers of the creation of open-source software, whose system development is essentially done for free by volunteer software specialists throughout the world. But open-source software has created another market oppor-

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