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Writing English for communicating internationally

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ABSTRACT

Increasingly, English is used as the international language in science, and many people use it as a second language. Nonnative English speakers can face problems communicating their work and understanding others. Both primary and secondary users of English face cultural obstacles to communicate in scientific and technical fields. As in other languages, English contains regional varieties, dialects, and vocabulary that may not be understood fully by others. In addition, translating expressions and terms into English could hinder understanding because of inaccuracies in moving from one language to another. This paper addresses some of the problems scientists encounter when trying to communicate their research results, especially to nonnative English readers.

Additional Index Words: **Scientific language, English used as second language.**

Scientists who are able to speak and write in their nonnative language know it is difficult to communicate. An equally difficult struggle is trying to understand people who use English as a second language Just learning the vocabulary and structure of a language requires effort and concentration To communicate well in English requires some understanding of a particular country's culture How can we successfully use English to communicate internationally in science? This article presents background and some ideas on writing English for international use

An editor in Canada, Watson (1985), recently documented the preponderance of scientific articles published in English over those in other major languages (Table 1) About one-third of the articles written in English originated from nonnative English sources The most often-cited papers originated from 18 countries and were all in English Westley (1985), an editor in Nairobi, reported that in many instances the best scientists in a country are the most competent authors of scientific papers in English; thus, frequency of citation would correspond with competency.

We must also look at the quality of individual papers The way a scientist uses English affects his or her ability to present results, and ultimately determines the acceptance of a paper submitted for publication. Some journals offer formal or informal "rewriting services " If the editors believe a manuscript contains substantive information but is poorly written, a reviewer may be assigned to rewrite it Many journals cannot afford to offer such a service There are also ethical reservations about authorship in such situations Some journals simply reject papers that are written in difficult-to-read English

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UNDERSTANDING THE ENGLISH LANGUAGE

If we study the science vocabulary, according to Smith (1966), we find that many of the words were not in the English language a few centuries ago If the words did exist earlier, they changed from describing religious and human affairs to describing natural phenomena These changes took place both gradually and recently Smith calls "method" and "system" modern words "Classify" belongs to the 18th century, "organism" to the 17th, and "regular" to the 16th Words in science reflect the notions of law, order, and visible phenomena in nature, replacing the older notions of spirits, magic, and divine interference For example, "experiment" is an old word used in alchemy, but the word experiment as a process (to try by experiment) is modern

Modern word usage mirrors society (DeBakey, 1978) Language continues to change as society changes, preferably in the positive direction of better communication And for the benefit of those who use English as a second language, we should introduce changes that will make the language easier to understand (Booth, 1984) Some changes promote confusion, loose expression, and decrease understanding The common names corn and wheat are examples In England the word "wheat" is equated with "corn" (*Zea mays* L) But wheat to Americans means *Triticum aestivum* L Others call corn "maize" or use corn as a local name for the common cereal Homonyms pose a problem to many users of English The word "fix" has contradictory meanings, and in a sentence such as "He fixed the blockage" or "Genetic lesions were fixed" it is unclear which meaning is intended—*keeping in place* or *mending* Booth (1984)

Table 1 Articles ranked by number published in various languages, 1978, Science Citation Index From Watson (1985), with permission

Language	Articles	No cited
English	343 640 (100 476)†	202 185
Russian	15 011	6 489
German	14 651	7 392
French	10 168	5 365

† Articles in English from nonnative English sources

cites many such examples of problems in understanding and pleads for use of English that is clear to everyone.

Remnants of an early, wordy style of writing persist today in scientific literature. By far the worst contribution to the international use of English is the scientific style of poorly trained writers. Agricultural scientists who write in English would cultivate good writing (Fuccillo, 1978) by following the suggestions of teachers such as Woodford (1968) and Strunk and White (1959), and by learning "good" as opposed to "bad" style (Booth, 1984).

USE OF ENGLISH IN SCIENCE

This section reviews briefly the historical rise of English and addresses some of the problems scientists encounter when trying to communicate their results, especially to second language users of English. Further systematic work should be done to construct a detailed model to cover the use of English in communicating science internationally. Explanations offered here are based on the author's interpretations.

Poets suggest that communication depends on essential but elusive requirements that extend beyond language, and cultural as well as language obstacles impede information transfer in scientific and technical fields.

To learn the words and structure of a new language requires effort and concentration. I believe that, as poets suggest, we also need cultural preparation (a well-plowed ground) and receptivity (a tractored consciousness) before the seeds of a new language can grow and mature in us.

The Origin of English in Science Writing

To try to understand the origin of English and its status, *Life Magazine* editor asked Lincoln Barnett (1964) to write a story after observing the phenomenal spread of English after World War II. During the post-World War II era, most of the new nations of the world began using English as a main or associate language. Barnett found that one reason for adopting English over the centuries was its simplicity and expandability: a hard core of 1000 words, a few tolerant rules, and quick learning time (according to him 60 h of concentrated instruction). In addition, English has a large vocabulary, 500 000 and 650 000 words, which offers amazing flexibility.

Barnett saw the English language as a kind of Ganges River, gathering tributaries from many other languages yet flowing in its own deep channel. Modern English came from a base consisting of 50% Germanic (Anglo-Saxon, Scandanavian) and 50% Roman (Latin, French), but it borrows words from many languages. In the years 1250 to 1400, for example, an estimated 10 000 French words migrated into English, 70% of which still remain.

VARIETIES OF ENGLISH

Despite its widespread use, English is not and never has been the same language worldwide. Like plants, it has varieties. It is, after all, one of 132 languages comprising the Indo-European linguistic family. It has been diverse as a written and spoken tongue for centuries, as demonstrated by this fragment from Geoffrey Chaucer (1340–1400), quoted by Barnett (1964):

Ther is so gret divesite
In English, and in wryting
Of our tonge, so prey I
God that non myswrite thee. . .

Users around the world have revised English so that today it not only looks but sounds different in every country.

Kachru (1983) and others have distinguish between British English and transplanted/nonnative varieties of the language. Speakers of transplanted varieties include American, Australian, Canadian, and New Zealander. More than 81 million persons in 21 countries are learning the language (Table 2).

Table 2. English speakers in various countries worldwide.

Country	Number of English speakers
England	55 million
USA†	182 million
Australia†	13 million
Canada†	13 million
New Zealand†	3 million
Nonnative English-speaking countries, including India	85 6 million

† Transplanted varieties of English From Kachru (1983)

Grammarians strive to identify contemporary usage (Quirk et al., 1972). Who speaks or writes the best English? The "Oxbridge" speakers, the acknowledged leaders, are now vastly outnumbered and have other contenders, including midwestern Americans and television announcers of many countries. As for written English, according to Barnett (1964), its early critics, including Dryden (1631–1700) and Swift (1667–1745), were displeased to see the language altered by "foreigners." They argued that improvement of English began during the reign of Queen Elizabeth (1558–1603) and ended in 1642. Others believe that non-British users have improved English; the French influence of Charles II, for example, helped make the English sentence less stately, more concise, and fluid (Barnett, 1964). In spite of changes, good or bad, the linguistic origin of the language still persists. Thus, we have words like womanly and "manly," extending the fundamental concepts of male and female, masculine and feminine. Our use of words reflects and expresses contemporary life and thought.

American English

Of the many varieties of English, American is the oldest and has been continuously growing from the time it reached the Western Hemisphere with John Cabot in 1497. The first permanent settlement at Jamestown was in 1607 and the Mayflower arrived in 1620. James Russell Lowell, commenting on the early English in America, observed that the Colonists "unhappily could bring over no English better than Shakespeare's." Inevitably, critics noted

deviations from mainstream English, and by 5 Sept. 1780 John Adams wrote a letter to the U.S. Congress to introduce an Act "'. . .for refining, correcting, improving, and ascertaining the English language." In 1783, Webster's Grammatical Institute was founded, and by 1828 Webster's dictionary had added 12 000 words not found in Johnson's 1755 dictionary. Words were added in the same ways they are today:

1. Joining two or more words, as in Old English (earring). Recently this process added agroclimatology and biotechnology
2. Juggling Latin, French, English roots, and affixes as in Middle English (aqualung)
3. Putting together verbs and nouns (Shakespeare's method), but also nouns and adjectives, adjectives and nouns, verbs and adjectives, and verbs and adverbs (genetic engineering).
4. Shortening words (professional—pro)

Settlers coined words to describe the unique American environment; words like bullfrog, watershed, bottomland, underbrush, and others were added from local Indian languages or joined together from roots of Latin and European languages. The influence of European literature persisted for a long time; however. Early agricultural journals in America often reprinted articles from European periodicals. Below are two examples of the use of English in 19th century American magazines.

> The progress of natural philosophy has been unusually rapid. The measurement of the surface of the earth, as well as of heights, has been effected with an accuracy before unknown. The recondite properties of light and heat have been examined, and the existence of new plants ascertained.
>
> (Rumford, 1814)

> Many farmers, and others who set out an orchard, feel unwilling to lose all this labor of tillage, without some more immediate and apparent return than the growth of trees they have planted, and will desire to have some crop upon the land. Now, it is manifest, that two crops can not be so well sustained upon a given surface as one, but, in our fertile soils, and with the very partial crop of fruit trees, set at proper distances, it may, perhaps, be quite admissible to occupy the intervening space with root crops, so as to constitute what the farmers call a green fallow, rather than a naked one; potatoes, or other root crops, may, therefore, be introduced among and between the rows of trees, but on no account should crops of grain be allowed to occupy the orchard during the growing state; an almost universal prejudice prevails against the introduction of this class of crops, and it is probably well founded.
>
> (Derby, 1854)

The 1854 example by Derby is more verbose and roundabout than that of 1814 by Rumford. Literary innovators typified by Kay Boyle and Ernest Hemingway in the 1920s completed the American break from the English tradition of writers like Sir Walter Scott and James Fennimore Cooper. But remnants of the 1854 style persist in scientific writing.

Indian English

The East India Company, founded in 1600, brought the first English-speaking settlements to Madras, Bombay, and Calcutta. The English language had an enormous impact, and continues as an associate official language spoken by more than 18 million people. Leading publications, including scientific journals, are published in English. More than 900 basic words and thousands of derivatives evolved from Indian into English—words such as camphor, ginger, and bungalow. Fewer English words made their way into Hindi and other Indian languages. Indians speak and write a variety of English that has been well documented (Kachru, 1983).

Consider this serious communication:

> "I regret to inform that I am unable to attend office, as I have to attend the 10th day ceremony of my uncle who recently got expired."

Or headlines such as

> "Scandal Rocks Hoary Mutt"
>
> "Rowdy Sheeter Arrested"

Expatriates living in India must refer to an unabridged dictionary or Indian-English lexicon to discover the meanings of "mutt" (slang of math, a holy place where monks live) or "sheeter" (a person who has a police record). Indians, like other users of English, are changing the language. Prepone (Latin pre, before) is an example of a word commonly used in India to mean *to bring forward.* It was formed in the same way as postpone (Latin post, after) which means *to move back* or *delay.*

The above headlines and expressions defy full comprehension without determined effort to learn the culture to which the meanings of the words apply. And although the verbal repertoire of Indian users of English is acceptable, appropriate, and intelligible in the Indian culture, it is inefficient for international communication.

The problem of communication between one user of English and another is universal. George Bernard Shaw observed, for example, that England and America were two countries separated by a common language. In India the spoken form of English also presents difficulties in communication; pronunciation is a major obstacle. Following, however, are some generalizations about the written English found in a sample of Indian agricultural journals.

1. Each word carries semantic shadings or a "tail" of meanings associated with it. Second-language users reach for the main body of the word, but may pick synonyms inappropriate in the context.

   "Cultural operations were maintained *uniform* every year."

   The sentence is correct but stilted and means "The *same* cultural operations were used every year."

2. A word or phrase from a person's native language may not exactly render the concept into English.

   "Such multifarious utilities of soil survey data are often relegated to background. . ."

   The writer means "Many uses of soil survey data are usually disregarded or neglected."
3. Faults in writing and speaking impede communication, and the second language user is blamed for making more than his or her share of mistakes in spelling, grammar, and logic.

   ". . .phosphate which was capable of meeting [sic] out P requirement of the crop."

   "To maintain leaf wetness, spray inoculated plants raised in plastic pots were covered with polythene bags and incubated at desired temperature for desired duration in an incubator." (Vague; dangling infinitive phrase.)

   "Three sprays were given in two concentrations." (Faulty logic.)
4. Communication problems occur when persons interpret messages differently. The reasons can be culturally related, for example, when there is a failed attempt to use unfamiliar expressions or slang.

   "So, necessity being the mother of invention, U.S. farmers at their own pioneered in agricultural mechanization break throughs [sic]."

   "The data on grain yield of maize reveal for sure that both sources. . ."

SUMMARY

Using Good English to Communicate in Science

Following are a few suggestions on writing well for scientists who are nonnative English speakers.

1. Second language users of English transform expressions from their first language into English. Sometimes the change is accurate, but sometimes it is not. Dictionaries fall short in precise interpretation of synonyms, homonyms, and regional words. We must examine such words and coin new words that are clear to scientists worldwide. New technical words should undergo rigorous scrutiny by international groups on nomenclature.
2. Scientific writing contains faults of logic, precision, and clarity. Scientists must be trained to write well. Good scientific writing styles encompass more than grammar, spelling, and other fundamentals. Scientists should master these fundamentals but should also develop good writing skills.
3. Cultural and semantic barriers need not permanently impede communication. The idioms of one variety of English may appear strange to those using another variety; definitions should be given in these instances. We must remember that the writer's culture is an important factor in the words and expressions used, and the culture of the reader affects his or her interpretation of the written words.
4. Those who wish to improve their writing, regardless of whether they use English as a first or second language, should ask their colleagues to read their papers, and then rewrite several drafts to achieve the best possible manuscript.

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Note Added in Proof

The author's editors in the Council of Biology Editors (9650 Rockville Pike, Bethesda, MD 20814) volunteered to edit two papers per year (without pay) for journals that publish scientific papers by authors whose native language is not English and whose papers may be poorly written (*CBE Views* Vol. 10, no. 4:59, 1987).