

]ch[Monolingual Lexicography

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]a[Introduction: Lexicography in the Age of the Internet

]fo[In recent years there has been an increasing focus on the lexicon in applied linguistics, while the technology of dictionary compiling and dictionary publishing has changed beyond recognition, due to the availability of electronic resources such as very large corpora.

If the meaningful use of language is to be understood and applied, it is necessary, in the first place, to “get the words in” (Bolinger, 1970) and, in the second place, to discover how words go together in structures and collocations (Sinclair, 1966, 1987, 1991, 2004). It is now possible to analyze the comparative frequency of each word and to identify its patterns of normal, conventional usage, using a technique called “corpus pattern analysis.” Patterns consist not only of constructions and clause roles such as subject, object, and adverbial (called “valencies” in systemic functional grammar) but also, more importantly, of collocations. Collocations disambiguate; for example, “executing young offenders in Texas” activates a different meaning of the verb *execute* from “executing the Governor’s orders.” So much is obvious. However, the question, “Precisely which collocations of a word activate which of its meanings?” raises some extremely difficult issues at both a theoretical and a practical level. The vocabulary of a language contains hundreds of thousands of lexical items. Discovering which lexical items collocate with which other lexical items more significantly than chance is a task for a computer: Humans manage to do it subconsciously somehow (for this is what enables them to use words idiomatically), but explicit analysis of the statistical significance of collocations is beyond even the most powerful conscious human mind. It can only be done by a computer. The need to analyze collocations computationally was predicted by Sinclair as long ago as 1966, when he commented that the problems of analyzing phraseology were “not likely to yield to anything less imposing than a very large computer.” The significance of collocations (word associations) can now be measured in corpora (very large electronic collections of text), using sophisticated statistical computing tools. At the same time, corpus analysis reveals that a small percentage of the uses of each word is deliberately unconventional and creative in various ways. The dividing line between conventional uses of a word and unconventional, creative ones is fuzzy, however, not sharp.

So in monolingual lexicography of the future it will be necessary to study the interfaces between valency and collocations on the one hand and meaning on the other. It is also necessary to study other interfaces: interfaces of words with speakers’ memories, beliefs, attitudes, and emotions; with the beliefs, attitudes, and emotions of other users of the same language; with the

world “out there”; and with other words in the language system. All these contribute to the elusive entity called “meaning”; they are all grist to the lexicographer’s mill.

Central to the role of the lexicon in modern cognitive linguistics is the recognition that analogy (rather than definition) plays a major role in the meaningful use of words. Identifying word meaning is not, as used to be thought, a matter of stating definitions in terms of necessary and sufficient conditions for set membership, but rather of identifying prototypes as a basis for analogical reasoning—specifically, identifying prototypical features of the concept or concepts that a word denotes. Meaning in natural language is built around prototypes (Rosch, 1973, 1975) or stereotypes (Putnam, 1970), and, thanks to corpus technology, the insights of Rosch and Putnam can now be applied to identifying the stereotypical phraseology associated with each meaning of a word. To date, lexicography has been slow to respond to this opportunity. Lexicographers and language students are, as a general rule, frightened of statistics. It therefore seems necessary to remind them that they do not have to be sophisticated statisticians to use the output of statistical computer programs for the analysis of language. What they need to be able to do is to decide whether the output of such a program is saying something useful and interesting about the meaning and use of a word: sometimes it is and sometimes it is not. So the lexicographer or learner has to *choose* when and how to use the computer’s statistical output, which must be presented in a user-friendly way.

Also relevant here is the notion of Wittgenstein (1953) that the meaning of a word such as *game* is best considered as “a chain of family resemblances”: Certain semantic features such as winning and losing are characteristic of many games, but not all: There are no necessary conditions for word meaning.

The need for very large corpora has been dramatically fulfilled since the 1990s, but up until now dictionaries have been slow to respond to the theoretical challenges of Wittgenstein, Rosch, and Putnam and to take advantage of the opportunities offered by large corpora. The challenge that Sinclair recognized so clearly in 1966 has at best been only tentatively met. The accounts of word meaning in monolingual dictionaries are still largely based on 17th-century Leibnizian assumptions, in particular that word meanings are discrete entities, like building blocks in a child’s Lego set. The role of collocations as meaning determinants and the ‘semi-prefabricated’ chunks of language that form a large part of all discourse are not yet adequately treated in any dictionary. In older dictionaries of certain European languages, an attempt was made to indicate phraseology, but, as this was done in the pre-corpus era, it was inevitably based on introspection rather than data.

]a[What Is a Dictionary?

]fo[A monolingual dictionary is an inventory of the lexicon of a language. (This entry deals only with monolingual dictionaries. For bilingual dictionaries see the list of cross-references below.) For each word or term entered in the dictionary, information is given about its meaning, spelling, pronunciation, and in some cases its origin or etymology, or about some subset of these facts. In languages that use an alphabetical writing system, the entry words in a dictionary are arranged in alphabetical order, often with subentries or “nested” entries for derivatives and idiomatic expressions. This simple fact of arrangement distinguishes dictionaries proper (sometimes called “semasiological dictionaries”) from onomasiological reference works such as Roget’s *Thesaurus* (1852) and WordNet (<http://www.wordnet-online.com/>), in which words are organized according to their conceptual relationships (synonyms, hyponyms, etc.). In Chinese, which uses an ideographic writing system, words are arranged in groups according to their ‘radicals’. (see Li Ming, 2006). Some present-day Chinese dictionaries add a Pinyin Romanization of the Chinese headwords, which are then arranged in alphabetical order in order to facilitate look-up.

]a[Recording the Lexical Inventory of a Language

]fo[A dictionary cannot include *all* the words in a language. Even a vast national dictionary of record such as the *Oxford English Dictionary (OED)*, 1884–1928) does not have such an aim. This is because the lexicon of any living language is dynamic: New words are coined every day (and very often forgotten the next day). From the point of view of applied linguistics, it is, however, reasonable to expect a dictionary to include all the words that are in normal use. This poses problems for the lexicographer, because the borderline that divides the words of a language from nonwords is a vast fuzzy gray area. The three main gray areas are: names, register, and technical terms. A few words may be said about each.

]b[Names

]fo[Most large dictionaries record and explain terms such as *Scottish*, *Londoner*, *Chaucerian*, and *Kafkaesque*. These words are defined in relation to terms that denote a single entity, in other words names: *Scotland*, *London*, *Chaucer*, and *Kafka*. Should such names also be in a dictionary? Some lexicographers argue that a dictionary should serve as a collective cultural reference index and that famous names such as these should be included and explained for this reason. However, it would obviously be absurd to try to record all the names in the lexicon of a living language. English speakers know that “John Smith” is a common English name, but it is not a term that belongs in a dictionary.

]b[Register

]fo[Most dictionaries include at least some slang words and even a few dialect items, but in both these domains there lie many thousands of terms that are included only in specialist slang dictionaries such as Green (2010) or Wright (1898-1905). Nearly all people from the Bristol and Bath area of England know the term *gert lush* (a general expression of approval, connected etymologically with the standard words *great* + *luscious*), but few would expect to find this expression in a general dictionary. Some dictionaries also include archaic terms and senses, especially those that were used by writers such as Shakespeare or Austen, whose works are still widely read today, but again this is a large gray area.

]b[Technical terms

]fo[*Strobe lighting* is a familiar term denoting a familiar phenomenon, and a reader can expect to find it explained in a dictionary. But what about *strobila* and *strobilation*? *Strobilation* literally (etymologically) denotes the act of twisting, but in English it is found only in a highly specialist domain (it denotes the asexual method of reproduction of tapeworms and jellyfish, in which they twist off polyps from their bodies to create new tapeworms or jellies). This is a classic example of a borderline term that is included in some large one-volume dictionaries but not in others. It is not the sort of term that one would expect to find in a dictionary aimed at language learners.

]a[Different Types of Monolingual Dictionaries

]b[Learners' Dictionaries

]fo[From the point of view of applied linguistics, the most important type of monolingual dictionary is one compiled for use by language learners. For English, the most important works in this genre (given with the date of first publication) are the *Macmillan English Dictionary for Advanced Learners* (*MEDAL*, 2002), the *Cambridge International Dictionary of English* (*CIDE*, 1995; now called the *Cambridge Advanced Learners' Dictionary* or *CALD*), *COBUILD* (1987), the *Longman Dictionary of Contemporary English* (*LDOCE*, 1978), and the *Oxford Advanced Learners' Dictionary of Current English* (*OALDCE*), first published in Japan in 1942 by Kaitakusha as the *Idiomatic and Syntactic Dictionary* and re-issued by Oxford University Press in 1948, with the text unchanged, as the *Advanced Learner's Dictionary*, *ALD*). Changes of title in successive editions of this and other dictionaries have created a bibliographical quagmire. Each of these dictionaries has its admirers and detractors; each has some unique selling points. What they have in common is that they all attempt to record and explain all the words of contemporary language that are in normal

use, while ignoring abnormal, rare, and unusual words and senses. Some of them use a restricted defining vocabulary of around 2,000 words, sacrificing fine nuances of definition in return for greater comprehensibility. Most of them nowadays base their lexicographical research on a large corpus of English texts. *COBUILD* claims to be “corpus-driven”, while the others are more or less corpus-based (i.e., they use corpus data more selectively). *COBUILD* rejects the traditional style of definition by paraphrase, preferring instead to encode the term being defined in a “full-sentence definition.” For example, where a traditional dictionary says “fly: . . . 4. to travel through the air in an aircraft or as an aircraft does” (where the syntax is necessarily somewhat unnatural due to the principle that the definitions must be substitutable in any relevant context), *COBUILD* characterizes the context at the same time as explaining the meaning, thus: “3. If you **fly** somewhere, you travel there in an aircraft.” *COBUILD* took “folk definitions” and built them into a logical system (Hanks, 1987). They are intended to give users a modicum of implicit guidance on normal phraseology in conjunction with an explanation of the meaning.

Many but not all of the dictionaries just mentioned have been adapted to create American editions. Mention should also be made of *Merriam Webster’s Advanced Learner’s English Dictionary* (*MWALED*, 2008), a clear, sensible, and thoroughly practical, though conservative, dictionary aimed primarily at learners of English as a second language.

]b[Historical Principles vs. Synchronic Principles

]fo[Dictionaries aimed at language learners aim to give an account of the words and meanings that are in everyday usage in the contemporary language. In other words, they are compiled on “synchronic principles”. However, great scholarly dictionaries such as OED do not have this goal. Instead, they are compiled on “historical principles”. That is to say, after stating the etymology, such dictionaries give the oldest meaning of the word first, not the current meaning. Since word meaning is very unstable, these different principles affect many entries, and it means that such dictionaries should be used with caution in applied linguistics.

In the first and second editions of OED, a dictionary compiled on rigorous historical principles, sense 1a of *camera* was stated as “an arched or vaulted room or chamber.” This was followed by “2. a council or legislative chamber; one of the departments of the papal curia; 3. a. *Optics*. Short for *camera obscura*; 4b; *esp.* that form used in photography.” This entry was completely revised for the 2010 on-line edition, but still, quite properly in accordance with the dictionary’s historical principles, the older senses were placed first, followed eventually sense 4b added: “A device for taking photographs, using an aperture or lens to focus a visual image on to a light-sensitive material or (in later use) a digital sensor.”

The great *Dictionary* of Samuel Johnson (1755) aimed at historical principles (tempered by common sense). One reason for this is that in the 18th century people all over Europe, including Britain, believed (wrongly) that etymology somehow guarantees meaning. In fact, meaning conventions are arbitrary and change from time to time, as we saw in the case of *camera*. The Merriam Webster “Unabridged” dictionary (3rd edition, 1961; “MWIII”) also follows historical principles. More surprisingly, the Merriam Webster Collegiate series (11th edition updated, 2006), aimed at the general public rather than linguistics and cultural historians, also follows historical principles.

Historical principles were first explicitly challenged by *Funk and Wagnalls standard dictionary of the English language* (FW; 1894), which aimed to put the modern meaning of each word first. Unfortunately, during the mid 20th century the publisher of this fine dictionary did not invest in keeping the dictionary up to date, nor in publicity for it. By the time Rowan and Martin’s *Laugh-In* came along in 1968, with its catch phrase “Look that up in your Funk and Wagnalls”, it was too late: the dictionary was already dead.

The synchronic principles established by FW were not lost, however: they were followed by other dictionaries aimed at the general public, in particular *The American College Dictionary* (ACD, 1947) and its successors and the *American Heritage Dictionary* (AHD, 1969). These dictionaries are discussed in the next section.

ja[The Technology of Dictionary Compiling

lfo[Lexicography is accretive. That is, every new dictionary builds on foundations laid by at least one of its predecessors. The *American College Dictionary* (ACD, 1947) in particular forms part of an accretive chain: It was based on the *New Century Dictionary* (1927), which was itself an abbreviated and updated edition of the multivolume *Century Dictionary* (1889–91). It was the basis for the *Random House Dictionary of the English Language, Unabridged* (RHD, 1966) and, in Britain, for the *Hamlyn Encyclopedic World Dictionary* (EWD, 1971), which in turn was the foundation of the *Australian Macquarie Dictionary* (1981). American dictionaries such as ACD, RHD, and the *American Heritage Dictionary* (AHD, 1969) served as a model for the *Collins English Dictionary* (CED, 1979). With its clear definitions and inclusion of much technical terminology and entries for names of famous people and places, CED mounted a successful challenge to the market leaders in British dictionary publishing of the mid 20th century: the *Concise Oxford Dictionary* (COD, 1911, 1976) and *Chambers’s Twentieth Century Dictionary* (TCD, 1901, with many subsequent updatings). The latter was a magnificent “ragbag” collection of rare and

unusual words and senses—including many obscure Scottish dialectisms—as well as more mundane words. Chambers is also noted for its occasional humorous definitions (e.g., *éclair* is defined as “a cake, long in shape but short in duration”; *middle-aged* is defined as “between youth and old age, variously reckoned to suit the reckoner”).

COD has enjoyed a long history; at the time of writing it is in its 11th edition. The 6th (1976), 8th (1990), and 10th (1999) editions represented radical departures from their predecessors: In effect, the title has been borne by four very different dictionaries, which have in common only an approximately similar level of coverage of the language. The 10th edition is based not on the preceding edition, but on the *New Oxford Dictionary of English* (*NODE*, 1998), a much larger work on synchronic principles, which used evidence both from the *OED* reading program and from the British National Corpus to create a new description of the vocabulary of contemporary English in a single volume of “desk dictionary” size.

In 1999 the British publisher Bloomsbury and the American software giant Microsoft combined forces to create a dictionary of similar dimensions, under the generic name “Encarta,” touted as “the first dictionary for the electronic age.” At first, it was published in a so-called “world edition” (*Encarta World English Dictionary*), but it failed to find much favor with the British, American, or any other market. Subsequent editions were published in Britain and America under a variety of titles including the name “Webster,” which seems to have been regarded by the publisher as a recipe for encouraging public acceptance. Despite its grand claim, the Encarta dictionary did not take advantage of lexical research in “the electronic age”: it is a very traditional dictionary, paying little attention to such matters as corpus evidence for collocations and phraseology, or to the recent advances in cognitive linguistics and the philosophy of language mentioned at the start of this entry.

From the great dictionaries of the Renaissance, which aimed to record the entire vocabulary of Latin (Calepino, 1502; Estienne, 1531) and Greek (Estienne, 1572), to the best-selling dictionaries of today and *Encarta*, lexicography has been driven by the technology of typesetting, printing, and book publishing. The works by Henri and Robert Estienne in particular pushed the technology of typographic design, printing, and bookbinding to its limits. These limits were refined from time to time between the 16th and the 19th century, but the basic principles remained unchanged until the advent of the 20th century. As early as 1966, the *Random House Dictionary* was compiled using a computer to classify and sort the words and definitions. This meant that lexicographers could be freed from the tyranny of alphabetical order: All terms in a domain could be written as a set and then sorted into place by computer, with resulting benefits for clarity and consistency.

]a[Online Dictionaries of the Future

]fo[In recent years, sales of dictionaries in book form have dropped dramatically, while all reputable dictionaries (and some less reputable ones) have become available for online consultation, free of charge. Online publication of dictionaries is opening up tremendous possibilities for complex searches in dictionaries and dramatic shortening of the time-lapse between lexical research and publication of results, links to other information sources, and new business models. An instructive example is OED Online (www.oed.com). For this, in partnership with the software company IDM, a new editing and browsing system called PASADENA was developed (Elliott & Williams, 2006). The new system not only had to be flexible and robust for editors and readers alike (being able to process many thousands of simultaneous hits), but also had to offer improvements in functionality such as tracking the 600,000 cross-references; standardizing the processes for bibliographical references (for example, enabling citations to be updated systematically when a new edition of a cited work was published); flagging probable errors; and many others.

Many other dictionary editing and browsing systems have been developed in the past few years. One of the best (robust and user-friendly) is the DEB dictionary editing and browsing system (<http://deb.fi.muni.cz/debdict/>) created by the NLP group at Masaryk University, Brno, which is now used as a platform by a wide variety of large reference projects in several different European languages.

Lexicography at its best has always been based on careful analysis of the available evidence. With the advent of the Internet, large corpora, and statistical and other tools for corpus analysis, a paradigm shift in the availability of evidence for lexicography has taken place, and this will change the nature and content of future dictionaries. A central feature of lexical research in future will surely be much fuller attention to the contexts in which words are used. Two pioneering projects in this regard, both currently suffering from “funding starvation,” are FrameNet (<http://framenet.icsi.berkeley.edu>) and Corpus Pattern Analysis or CPA (<http://nlp.fi.muni.cz/projects/cpa/>).

]b[FrameNet

]fo[FrameNet is based on the principles of frame semantics (see, e.g., Fillmore, 1982), which argues that words must be grouped and explained in relation to context of utterance—the situation or “frame” in which a word is used; thus, there cannot be buying without a buyer, a seller, an object or a service that is bought, and a price paid. This could be described as “the commerce frame.” (FrameNet itself makes more fine-grained distinctions, with at least three relevant frames:

Commerce_buy, Commerce_sell, and Commerce_scenario.) The “risk frame” has as its core elements a person who is the risk taker, a valued object that is put at risk, an action or event, a possible bad outcome, and a desired good outcome. Not all of these frame elements are explicitly realized every time the word *risk* is used, but they are all implicitly present.

At the time of writing, 960 semantic frames have been described in FrameNet, with annotations of over 11,000 lexical units. FrameNet has not set itself a target inventory of frames or frame elements. Frames, their elements, and the lexical units that populate the frames are explored more or less at random. Example sentences are selected from the British National Corpus and annotated to support the relevant sense of each lexical unit in a given frame.

Contrary to the claims of some of its apologists, FrameNet cannot be used—at least for the foreseeable future—for purposes of sense discrimination. This is because it does not make any attempt to investigate contrastively *all* the frames in which any given lexical unit participates. Most of the words analyzed by FrameNet and assigned to one frame or another have at least one other sense that has not yet been analyzed or assigned to any frame.

]b[Corpus Pattern Analysis

]fo[The procedure of the Corpus Pattern Analysis project (Hanks, 2004; Hanks & Pustejovsky, 2005) is different. The lexicon is analyzed word by word in a fairly traditional manner. But meanings are associated with patterns of word use, not with words in isolation. The aim is to identify, by corpus analysis, all normal patterns of usage associated with any given word. The first product of CPA is a pattern dictionary of English verbs (PDEV), which currently offers a comprehensive analysis of 700 verbs (out of an eventual total of 5,500—all the verbs in normal use in English). The theme of CPA is that words in isolation (as listed in dictionaries) have only “meaning potential” rather than meaning. Meanings in CPA are associated with phraseological patterns, so the first task is to discover, by comparing huge numbers of actual uses, the normal phraseological patterns of use for any given word. This is not a matter of syntactic alternation: It is a matter of discovering patterns that have contrasting meanings. A “pattern” in CPA typically consists of a verb together with its arguments or valencies: subject, object, and adverbial. The lexical items that populate an argument of a pattern are grouped according to semantic type. Very often, different meanings of a verb are distinguished only by the semantic types of its arguments. Thus, *blowing up a balloon* and *blowing up a building* activate quite different senses of *blow up*, although the syntactic structure in each case is identical. Terms such as [[Building]] (in double square brackets) are used in CPA to denote a semantic type, bringing together a large number of canonical lexical items (e.g., *building, house, factory, university, TV station, bridge*) and some non-

canonical items such as *chimney*. Semantic types are held in a hierarchical “shallow ontology.” The population of each semantic type is in principle open-ended: It is always possible that a new term—or a name—denoting a building will be discovered, or used in some future document.

CPA analyzes *all* occurrences in a randomly chosen large corpus sample of each verb. Each use of the verb in the sample is either assigned to a pattern or treated as an “exploitation of a norm.” Exploitations include various kinds of dynamic language use, including figurative language, anomalous arguments, and elliptical usage. Thus, CPA is not only creating a new kind of dictionary, but also a new linguistic theory, in which dynamic exploitation of normal usage is distinguished from the more static norms on which successful communication relies.

]a[Conclusion

]fo[Lexicography has always been closely associated with and partly dependent on technological innovation. We live in a period of technological transition, as computers play an increasingly prominent role in the lives of ordinary people. Therefore, as suggested in the last few sections, computer technology is likely to play an increasingly important role in lexicography. It is not possible, at the present time, to predict what form this will take, mainly because the business model for dictionaries is changing. Sales of dictionaries in book form have plummeted in recent years. The traditional business model of funding a new dictionary by a publisher in the expectation of profit from massive sales has evaporated. The alternative—public funding of lexicography through large research grants—which was normal in Central and Eastern Europe during the communist era, lies well beyond the constraints under which most research funding agencies in the capitalist world operate today. At the same time, users of online dictionaries expect the information to be made available free of charge. So dictionary publishers are reliant on what used to be regarded as “subsidiary income” from advertising and other indirect sources—hardly an incentive for a massive capital investment. It may be that, with the sudden explosion in popularity of electronic book-reading devices such as Kindle, dictionaries of the future will be automatically built into such devices. A reader ploughing through a text on such a device will be able to point at a particular word and get not only a dictionary entry for that word, but an “intelligent” dictionary entry, which responds to the context and presents the definition, paraphrase, or synonym set that is most likely to be relevant (drawing on research such as CPA and FrameNet), rather than just a simple list of dozens of senses. Such a development, however, is still far in the future.

]linespace[

SEE ALSO: Bilingual Lexicography; COBUILD Project; Corpus Linguistics: Overview; Johnson, Samuel and Lexicography; Lexical Bundles and Technology; Lexicography Across Languages;

Lexicography in Non-European Languages; Technology and Phrases; Technology and Terminology; Webster and American Lexicography

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