SCRAMBLED ALPHABETS IN WORD-LISTS

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Arrange the letters of the alphabet in a specified order, and imbed these in a list of words, the object being to use as few letters as possible in the word-list. For example, if the letters are arranged in alphabetic order, and one is restricted to boldface entries in the Merriam-Webster Pocket Dictionary, with no single-letter words or abbreviations allowed (such as DDT or TV), then the minimum-letter word-list appears to be

nAB CoDE FiG HlJacK LiMN OP QuRSh TUrVes WaXY Zip

with a total of 40 letters used.

Each of the 26! arrangements of the alphabet has a minimum embedding: there is some list of words with a total of n letters, but no list of words with n-1 or fewer letters that will do the job. What are the maximum and minimum values of n, taken over all possible alphabetic arrangements? What are the corresponding arrangements?

It is quite easy to find the minimum value of n: 27. There is no pangrammatic word-list based on the Merriam-Webster Pocket Dictionary, which would make n equal to 26. One alphabetical arrangement achieving this value of n is given by:

LAMB SQUaWK FJORD CHINTZ VEX GYP

It is much more difficult to find the maximum value of n. After considerable trial and error, I have been able to find an alphabetical arrangement for which the minimum word-list has 52 letters:

Is Up AgO bEY aCQuit JaDe oR oX GoWn PoeM SaFe He LoNe ZeBu KiT Vie

It seems wise to separate the vowels and consonants and treat these separately. The only vowel-pairs which do not form three-letter words in the Pocket Dictionary are IU, UI, and UA, so these have been placed together to form IUA. In arranging the consonant-order, one must avoid consonant-pairs that form three-letter words and consonant-triples that form five-letter words; this has been accomplished in the above sequence (PoeMS, PraMS, etc., are not boldface entries). There are a few letters of the alphabet (K, Q, C, J, V, Z) that do not form two-letter words; it seems advisable to place these near each other if possible, or at the end of the sequence, to minimize the number of four-letter words they can form with their immediate neighbors. In the sequence above, there are no four-letter words containing TV, CQ, or QJ.

Can one reduce the number of letters to 51 or, better yet, find some other alphabetical arrangement in which the minimum number of letters in the word-list is 53 or more? This seems like an ideal task for a computer.

More generally, can one find the minimum and maximum values of n for words taken from other dictionaries? The larger the dictionary, the smaller these values will be. (For all but the smallest dictionaries, the minimum value of n will be 26.)

For a final problem, consider minimizing the number of words in the list instead of the number of letters.

THE DICTIONARY OF CONFUSABLE WORDS

Written by the eminent lexicographer Laurence Urdang, The Dictionary of Confusable Words (Facts on File, 1988; $29.95) is a 391-page book distinguishing the meanings of

(1) synonymic groups of words, such as strike/wildcat strike/sitdown strike/slowdown/work to rule/strike action
(2) words that are spelled or sound similar even though not synonymous, such as affect/effect or compliment/complement
(3) members of a highly-specific group, such as accordion/concertina or Old Kingdom/Middle Kingdom/New Kingdom or judo/jujitsu/karate/kung fu

Each word or term in a group is clearly and concisely defined; especial attention is given to the differences among the various words in a group. Though the typical discussion is half a page or less, some essays extend as much as two full pages. Although much of the same ground is covered by Adrian Room in his books Room's Dictionary of Confusibles (1979) and Room's Dictionary of DIstinguishables (1981), there is surprisingly little overlap between Urdang and Room, perhaps reflecting the idiosyncratic nature of such groupings. Of Urdang's first 20 entries, Room duplicates only one (accordion/concertina) and approximates another (account receivable/account payable is transmuted into the more general account/bill/invoice/statement). Note that mere spelling variations are not considered worthy of inclusion; thus, confusible/confusable is not an entry!