Webster's Third New International Dictionary (N13) defines pattern-word as "(in) cryptology: a plaintext idiomorph". The same source defines idiomorph as "a pattern of repeated letters in cryptography". Thus to a cryptanalyst any word with one or more repeated letters is a pattern-word. PROPER, STATE and MUUMU are pattern-words, whereas THING, WORD and UNCOPYRIGHTABLE are not. In a simple substitution, monoalphabetic cryptogram, pattern-words can provide a method of quick solution where the cryptogram is of the easy or medium-difficult variety. Thus a long word ending with the pattern -ABCC is very likely to end in -NESS. The ending -DBBC is often -ALLY.

Although not referred to as such, pattern-words have been touched on in Word Ways before. This article will refer to some of those previous discussions and attempt to enlarge on them a bit. Unless otherwise noted, the sole authority for all words used in this article is Webster's Second New International Dictionary (N12).

Isomorphs

If two or more words exhibit exactly the same pattern, it is convenient to call such words isomorphs. Although N13 appears to limit the term isomorph to the ciphertext rather than the plaintext pattern, this extension of meaning will not cause any confusion. David Silverman has used the word with similar meaning in Kickshaws.

The August 1969 Kickshaws posed a number of problems for the readers. One was to find a word fitting the pattern 123232. The solution given was ROCOCO; however, Walter Penney latter added BANANA and MANANA as equally legitimate solutions. A second problem gave ILLICIT for the 1221314 pattern, and Mr. Penney added ASSAGAI as a second example. If either of these patterns appeared in a cryptogram, the solver would be reasonably sure that the correct word was one of the above. He would, perhaps, be surprised to learn of the existence of twelve more words for the first pattern, and nine more for the second:
If your word is of the 123232 pattern and the next word in the cryptogram is patterned 454167, it's likely that the first word is TAKAKA since it appears only as a part of the two-word entry TAKAKA SYSTEM. PATATA and ARRAYAN are marked with the two vertical bars signifying foreign words, and ESSELEN will be found under the entry for ESSELENIAN. I hesitate to say that there are no more isomorphs of these two patterns. Can anyone find others?

In the same issue, David Silverman mentioned that there were no isomorphs of ALFALFA other than ENTENTE. However, there are at least four more:

SEMSEMS SIM:SIMS SOUSOUS HATHATH

The last is a Biblical name appearing below the line in NZ. Surely there are no more 1231231 pattern-words -- or are there?

Heads 'N Tails Words

In the May 1970 Kickshaws, Josefa Byrne exhibited a list of words in which the same beginning and ending letter-groups surround a "core" of one letter. Her list was an attempt to find such a word using each letter of the alphabet as a core. Legitimate words were given for all letters except Q. No attempt was made in this initial listing to find the longest possible word for each central letter, and nearly half the words shown were three letters in length. The list below gives the "best" word or words in each case. The only criterion was length as long as the word could be found in NZ, or when necessary in some other English language reference. Examples from Mrs. Byrne's original list that I was unable to improve on are indicated with an asterisk.

A. PATAPAT, PILAPIL, DUB-A-DUB, REDARED, SARASAR
    B. ERBER
    C. OUTSCOUTS
    D. DADDAd
    E. SERESER
    F. KAFKA*

The last is a Biblical name appearing below the line in NZ. Surely there are no more 1231231 pattern-words -- or are there?
133

G. MAGMA*, ALGAL, DAGDA, EDGED
H. OUTSHOUTS*
I. BELIBEL, DERIDER, NEMINEM, OIDIOID, TREITRE
J. ANJAN*
K. ASKAS
L. KHALKHA
M. PAMPA*, BOMBO, MAMMA, MUMMU
N. CHONCHO, DYANDVA, TSANTSA
O. INGOING, LINOLIN
P. OUTSPOUTS
Q. TAQTA
R. CHERCHE
S. HOTSHOT*
T. ESTES*, ARTAR, ITCIC, TATTA
U. SHUSH, SIUSI, VEUVE
V. SHAVSHA
W. ABWAB
X. MANXMAN
Y. REYRE
Z. AZZAZ*

KAFKA cannot be found in NI2 or NI3 but is in the American Heritage Dictionary. NEMINEM is in NI2 only as a part of the well-known (in English) Latin precept, "Ignorantia juris neminem excusat". ASKAS is the plural of ASKA found in the Century Dictionary and Cyclopaedia. TAQTA is from the Handbook of American Indians. HOTSHOT is hyphenated in NI2 but not in NI3. REYRE is found in Phillips' Index of Biographical Reference, and AZZAZ comes from the Life Atlas.

Half of the letters of the alphabet are represented by five-letter words. Can the reader improve on any of these by finding longer examples? Can anyone find a Heads 'n Tails word longer than nine letters?

**Palindromes**

If a Heads 'n Tails word of five letters or more can be found using each letter of the alphabet as a core, the next logical step is to search for palindromic words meeting the same conditions. The list below is a first attempt at such a task and is obviously in need of some improvement. All words are from NI2 except for those noted NI3 or LoV (Language on Vacation, by Dmitri Borgmann).

A. REPAPER, ROTATOR
B. SAWBWAS
C. ECE (NI3)
D. DEEDEED, MURDRUM
Another possibility for A is VITATIV mentioned in LoV and again in the February 1970 Word Ways article, "The Evolution of a Palindrome". In the Word Ways article, Mr. Borgmann gives the Funk & Wagnalls Unabridged Dictionary as a source. Even better for A would be Mr. Borgmann's excellent coinage of EVITATIVE in the same article. The three-letter examples above for C and H should certainly be possible to improve upon. CAPAC will be found in N2 only as the second part of the two-word entry MANCO CAPAC. The letter Q is again a stumbling-block; can anyone find a legitimate word? Another possibility for R is EVEREVE, mentioned in the August 1968 issue of Word Ways as a brand of perfume. DETARTRATED, another of Mr. Borgmann's creations, would be an apt coinage for T. LAVAL is in N2 as a part of the three-word entry CACHOU DE LAVAL. NARIHIRAN is cited in the November 1968 Word Ways.

Pattern Problems

The following questions are based on N2. Answers will be found in the Answer section:

1. ASSESS: another the three inline notes

2. ASSESS: one A. them common

3. In addition to there are As a major you find

4. There are letters of a letter word MUMM, common. There are references Word Ways etymology I a legitimate two-word CUMBERICATION anyway.

5. One word Can anyone

6. ESSEES and three does not locate it contain the
1. ASSESSES is a common eight-letter word with five S's. There is another word with five S's in N12, but it is neither plural nor the third person singular form of a verb. You might call it a feminine noun. Can you find it?

2. ASSESSEE is an eight-letter word with four S's, three E's, and one A. Can you find four other four-three-one words, none of them containing an S? The four patterns are 12321212, 12123212, 12321121, and 12213221.

3. In addition to ASSESSES and the answer to question #1 above, there are two other eight-letter words with five of the same letter. As a matter of fact, they are transposals of one another. Can you find them from their patterns and definitions?

4. There are four possible patterns for four-letter words with three letters of one kind: 2111, 1211, 1121, 1112. Almost all such four-letter words are the 1211 type, e.g. BIBB, EPEE, LILL, LOLL, MUMM, SESS, ZIZZ as listed in LoV. IIWI is probably the most common 1211 example; can you find one other 1211 word in N12? There are no 1112 words in N12, although they exist in other references. The existence of AAAT is implied in the May 1971 Word Ways (p. 113), and it is discussed more fully in "A Geography Lesson" in the August 1970 issue. There is, however, a legitimate 2111 word in N12. It is the first word of two different two-word phrases. The second words of these phrases are CUCUMBER and THISTLE. I have left out one minor piece of information regarding this word, but you should be able to find it anyway.

5. One word in N12 has the pattern 1234123423. Can you find it? Can anyone find another word with the same pattern?

6. ESSEES and SEESES are six-letter words with three of one letter and three of another. There is one three-three word in N12 that does not contain the letter S, with the pattern 121122; can you locate it? (DEEDED is another three-three word which does not contain the letter S.)