

## SHIFTGRAMS: SPANGLED WORDPLAY

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To form a shiftgram of a word, two operations are performed. First, it is enciphered using a shift-cipher, which replaces each letter by the letter  $n$  places further on in the alphabet. The result is then transposed to form a word. Howard Bergerson introduced shiftgrams in "Sea-changed Words" (WW 2.1969-24). In "Shiftgrams" (WW 2.1980-22), Tom Pulliam gave more examples and called the operation an  $n$ -shift.

For example, if SPANGLED is enciphered using the 11-shift, the result is DALYRWPO, which transposes to WORDPLAY. The same result can be obtained by doing the operations in the other order, using the same shift: transpose SPANGLED to LDGSEAPN and encipher using the 11-shift, and the result is WORDPLAY. I will notate this as SPANGLED(11)WORDPLAY. The process can be reversed using the 26- $n$ -shift; thus WORDPLAY(15)SPANGLED.

The 13-shift is special in that, if string  $\alpha$  13-shifts to string  $\beta$ , then  $\beta$  13-shifts to  $\alpha$ . A transformation like this is termed self-inverse. The only self-inverse shifts are the 0- and 13-shift. The 14- to 25-shifts are inverses to the 12- to 1-shifts. Thus, by suitably choosing the order in which to give the words in a shiftgram pair, I need not use a shift of more than 13.

Note that, in a set of words which shiftgram to each other, any of the words may be replaced by any of its anagrams. In this article, such anagramming without shifting is not given especial mention.

A special case of the shiftgram is the autoshiftgram, a word which can be shift-ciphered to a string which transposes to that same word. Tom Pulliam reported TANGER. Any anagram of an autoshiftgram is also an autoshiftgram; two of the anagrams of TANGER will turn up later in this article. The longest autoshiftgram is TANGANTANGAN. This and several 10-letter ones were published in Colloquy (WW 5.1980-88). All known ones use the 13-shift. Can readers find one which uses a different shift? Go, squawky mice!

### The longest shiftgrams

Tom Pulliam gave examples of 9-letter shiftgrams for most shift-ciphers. Dmitri Borgmann found several 10-letter examples. One of these, OVERLEANED(4)VIZIERSHIP, was published in Colloquy (WW 5.1980-88), which speculated on the existence of 12-letter examples other than the autoshiftgram mentioned above. Here are two:

apprenticing (11) platycyrtean      precipitants (11) pentadactyle

Here is a selection of 11-letter examples. Note that PENTADACTYL below and its 12-letter variant spelling above result from shiftgramming two words with the same shift; however, these latter two words form a well-mixed transdeletion, so the 11-letter example is not a trivial variant of the 12-letter example. The example with the 13-shift is almost an autoshiftgram; in fact it is a transubstitution (overbearinG, verberaTion).

nonweakness (4) warriorwise  
nonchemical (6) outstriking  
melagranite (7) Phyllanthus  
self-service (9) nonburnable

principiates (11) pentadactyl  
fuciphagous (12) submortgage  
overbearing (13) verberation

Here is a selection of 10-letter examples, showing the use of nearly all the shift-ciphers. Can readers find an example for the 8-shift, or find better examples for the 1- and 2-shifts? The words in the example for the 7-shift are heterograms (i.e. the letters in each word are all different). This is particularly notable; one reason is that the proportion of heterograms among words as long as 10 letters is small. Another reason is that, usually, if two long words are shiftgrams, then many common letters in one word shift to common letters in the other. This is easier to achieve with duplicates, because each shift-cipher shifts only a few common letters to common letters.

distringas (1) just the job  
pleasingly (2) cranking up  
oxidizable (3) gralloched  
aeroplanes (4) tripewives  
forbidding (5) twinklings  
phonically (6) overturing

lighterman (7) polyanthus  
unvizarded (9) windjammer  
shabracque (10) blockmaker  
distraught (11) deflectors  
brassworks (12) maidenweed  
preserving (13) refractive

### Apt shiftgrams

In "Shiftgrams: My Deft Ruse" (WW 2.1996-35), Susan Thorpe gave some examples of shiftgram pairs of words with related meanings, for example SEATED(1)BUFFET and REFUEL(13)SHERRY which suggest food and drink. If you drank too much, it might be GLASSFULS(8)CATATONIA. Darryl Francis gave SPAGHETTI(11)PLASTERED, which suggests that the meal was Italian! Susan Thorpe gave HYMN(1)ZION suggesting religion. Someone might go as far as ADOPTING(11)ZEALOTRY and condemning religions other than his own as UNREGULAR (13)HEATHENRY, which might be what a EUPHRATEAN(13)ARCHGUNNER had done in the war which, already as I write, some are calling Gulf War II. Those who oppose corporal punishment will leave BIRCHRODS(12)UNADOPTED. Red-light districts might have OVERROUGH(-3)BORDELLOS. And SUPERFAST(-12)DOGFIghTS.

### The largest sets of mutual shiftgrams

Among words of 9 or fewer letters, it is possible to find groups of more than two words which are mutual shiftgrams (without any of them being mutual anagrams). Some words in these sets are shiftwords, e.g. IRK and VEX, which 13-shift to each other, and are also synonyms.

3 9-letter words: paginated (11) prolately (3) brushwood

4 7-letter words: dhangar (1) hobbies (10) scrollly (2) quannet

5 6-letter words: divert (7) packly (2) carmen (7) thuyl (6) panzer

8 5-letter words:

kreng(1) floss(3) Kirov(3) nurly(6) extra(1) fubsy(3) vibex(3) hayle

9 4-letter words:

bias(2) duck(1) veld(3) yogh(1) phiz(5) menu(6) task(1) bult(6) Harz

dhak(1) bile(3) hole(4) slip(2) knur(1) vols(6) bury(2) dawt(4) hexa

late(1) bumf(2) dhow(1) Xipe(3) lash(4) plew(3) zhos(1) pita(7) whap

12 3-letter words: cel(2) gen(1) foh(1) pig(2) irk(3) nul(4) pry(2) rat(1) bus  
(2) wud(1) vex(3) hay(1) biz

### Shift-reversals

A particular case of the shiftgram is the shift-reversal. Dave Morice mentioned the concept in a Kickshaws article in WW 5.1991-109, and gave a few 5-letter examples. Reversals without shift far outnumber reversals with shift. There are 8-letter reversals, but the longest shift-reversals are of words of only 7 letters:

bolimba (3)	deplore	fish-god(12)	pasteur
Pan-Arab(4)	feveret	veneers (13)	Ferrari

Here are some 6-letter examples. Note that two of the words below shift-reverse to the same word. This implies that they shift to each other. Leonard Gordon reported this shift pair STEEDS(1)TUFFET in "Letter-shift Words in the OSPD" (WW 2.1990-61).

violet(3)	whorly	cushat( 8)	bipack	comodo(12)	Apayao
nappes(4)	witter	rifter( 9)	ancora	ferine(13)	ravers
loglog(6)	murmur	tuffet(10)	dopped		
lethal(7)	shoals	steeds(11)	dopped	argent(13)	garten

The pair ARGENT and GARTEN above is unusual among 13-shift-reversals: these words are anagrams of each other. The 13-shift-reversal is a sort of two-word variant of the auto-shift-reversal, a word which 13-shifts to its reversal. Examples of the latter phenomenon include RAVINE (Susan Thorpe, WW 2.1996-36), GRIVET, REBORE (both me, WW 5.1996-82), AVERIN, FRERES, CHERUP (a variant of CHIRRUP in Chambers and UKACD16) and, best of all, TAVERING.

All words are in Webster's 2nd or 3rd Unabridged, or UKACD16 (the 16th version of the United Kingdom Advanced Cryptics Dictionary).

### Shiftgrams for special groups

In "Shiftgrams Revisited" (WW 11.2002), Darryl Francis gave some shiftgrams of words drawn from particular groups, e.g. color words. Here are some more examples. Following Darryl's practice, I do not note anagrams of the base word, but do note words that are  $n$ -shiftgrams of the same base word with the same  $n$  and that therefore anagram each other. Each number represents the amount of shift from the base word (not necessarily the immediately preceding word). Terms marked (DF) were already noted by Darryl; (Ch) are in Chambers; (W2) Webster's 2nd; (W9C) Webster's Collegiate, 9th edition; others, Webster's 3rd.

## Cardinal numbers

The charming shiftword of THREE is a variant of one noted in WW11.1998-245:  
 ZERO 4 divs vids, 9 Xian Xina (W2), 13 berm, 20 yilt, 23 blow bowl  
 THREE 4 xlvii  
 EIGHTY 22 ducape

## Chemical elements

Hahnium is element 105. Stibium is a former name for antimony.  
 ALUMINUM 6 oat-grass (Ch; 2 words in W3)  
 COPPER 22 lankly  
 GALLIUM 2 winnock  
 HAHNIUM 6 Tongans  
 STIBIUM 18 Takelma  
 THULIUM 10 swerved

## Color words

Some words, e.g. BRONZEN and SLATY, are color words in one sense even if not their primary sense.

BRONZEN 13 Bomarea  
 CARROTY 20 unwills  
 DUNNISH 21 cynipid  
 FUCHSIA 12 gourmet  
 GRAYING 20 acushla  
 GRAYISH 22 uncowed (W2)  
 GREYISH 20 cymbals  
 GRIZZLED 9 Manipuri unimpair (W2)  
 GRIZZLIER 9 Ripuarian  
 MILK-WHITE 22 Sphegidae  
 OCHROUS 12 gateado  
 RUBIOUS 12 ungaged (W2, which has gage but not gaged or ungage)  
 SALLOWY 19 telpher

If a color adjective is allowed, are its comparative and superlative also allowed?

BLACKER 13 proxeny (W2)  
 GREENER 22 Canajan (Ch)  
 REDDEST 1 suffete, 11 copepod  
 SILVERER 13 reverify  
 SLATIER 22 wanhope  
 WHITEST 22 apposed peapods

Is a noncolor word a color word?

NONGRAY 13 Balante Taleban, 20 Shuhali (W2)

NONGREY 13 Alberta latebra ratable  
UNGREEN 13 Earhart (W9C, UKACD16)

Darryl included ANATTO, which is a dye. If this is allowed, then so are these. No doubt I have overlooked other examples.

FUCHSIN 6 lay into  
MAUVINE 14 Ojibwas

#### **Letters of the Greek Alphabet**

CHI 6 Ino (W2) ion, 10 Mrs. 12 out tou (W2), 22 dey dye yed (W2), 23 fez, 24 fag  
OMEGAS 14 guacos  
SIGMA 18 Askey (UKACD16)

#### **US state names**

NEBRASKA 4 foreview (W2)  
WYOMING 6 costume (DF), 22 juckles (W2)

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