

FREQUENCY HETEROGRAMS

ANIL

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I. Transposals of ETAOIN SHRDLU

Etaoin shrdlu, the twelve most used English letters in order by an old count, is an entry in Webster's 3rd (*W3*) as the Linotype not-to-be-printed marker slug. When I noticed that **malnourished** misses by one letter (t) being a transposal of it I was tantalised and sought a full transposal. I found but one, **outlandisher**, an obsolete word for foreigner (OED) already noted by Darryl Francis in the February '73 *Kickshaws* (WW73-43). I also worked up two polyanagrams of etaoin shrdlu 'defining' it from two different angles, linguistic meaning (1, from *up/dn* p.17) and physical function as a slug (2):

1. **Hits don a rule. (Under-hots ail as ruled "no hit".)**

2. **Linoshad true hard 'line-oust' shard; "Line out, lose it!" had run on 'shed' ritual.**

[1. Hits and hots are the most popular letters, the rule is their order. 2. Linotypers routinely imprinted the metal slugs ('shards') with this self-referential "omit" message when needed.]

II. Frequency Heterograms

The previous search inspired a general hunt for transposals of the *n* most frequently used letters for each number *n*. These will all be heterograms--non-pattern words with no repeated letters, what Dmitri Borgmann called solo isograms. He gave many 13-15-letter examples, mostly coinages including a few 16-17s, in *Word Ways* (85-67) and *Language on Vacation* (Scribners, '65, p.296). None of his used only top letters, all missing by at least two. Here are my results, including those from another frequency count--that of the whole Cambridge Encyclopedia (D. Crystal, *Cambr. Encycl. of the English Language*, '95, p.265). Both show a surprising number of blanks--which I hope readers can fill. Less common words are defined below. All are in *W3* unless marked ^M(Macquarie'01), ^R(Random House'66), ^C(Chambers),

<i>n</i>	<i>n</i> th	Linotype letters	Cambridge Encyclopedia words	<i>n</i> th
1	E	E e	= (same letters as etaoin shrdlu)	E
2	T	et te	ea ae	A
3	A	ate eat eta tae tea	= " "	T
4	O	toea	-	I
5	I	oatie	entia taine tenia tineia	N
6	N	-	= "	O
7	S	atonies	otarine	R
8	H	-	anoestri arsonite notaries notarise rosinata seniorita	S
9	R	hairstone	orientals relations serotinal tailerons	L
10	D	-	-	H
11	L	-	-	D
12	U	outlandisher	-	C

or ^O(OED). Thanks to Jeff Grant for definitions from the last two sources and for other help.

et ate (dialect), or *and* ^R (in Latin phrases such as *et al.*)

te ti in the musical scale ^{M,R}, or Taoist virtue ^R, or a variant of tee, anything T-shaped

ae one (Scot. dial.)

ea river or stream (Eng. dial.)

tae to *or* toe (Scot. dial.)

toea ^M coin of Papua New Guinea, 1/100th of a kina

oatie ^O var. of oaty (in OED quotations)

entia entities, pl. of ens

taine ^O taken (obs.); also a surname

tenia tapeworm, var. of taenia

atonies slacknesses of muscle (lack of tonus) or of pronunciation (lack of stress)

otarine of the eared seal family

anoestri var. of anetri, pl. of anestrus, the period between heats in female animals

arsonite var. of arsenite, an arsenic salt (Google); also a rare var. of arsonist ^C

rosinate var. of resinate, a salt or ester of resin acid or of rosin

hairstone quartz thickly penetrated with hairlike crystals of other minerals

serotinal of the latter usually drier part of summer

tailerons ^C differentially operable ailerons and elevators of an aircraft's tailplane

III. We Try Harder.

To fill the blanks here are some flawed or nonce transposals (**bold**), or (fine) the best of the near-misses--a wrong letter of the highest rank (superscript) replacing the lowest ranked missing letter (second superscript). * = slot filled in first table (as with *n*'s 1-3 & 9)

<i>n</i>	<i>n</i> th	Linotype letters	Cambridge Encyclopedia letters	<i>n</i> th
4	O	*	ante Aten etna neat tane ⁵⁻⁴	I
5	I	*	* etain Etain Teian	N
6	N	astone atones Easton ⁷⁻⁵	= nerita ratine retain retina Tiranë ⁷⁻⁶	O
7	S	* Estonia	* ratione	R
8	H	oatenish anoestri ⁹⁻⁸ etc (above)	*	S
10	RD	throne-dais soldier ant ¹¹⁻⁸ authorised ¹²⁻⁶	ion halters north aisle throne-dais ¹¹⁻¹⁰ anchorites chain store ¹²⁻⁹ charleston ¹²⁻⁴	LH
11	L	detrusional ¹²⁻⁸ chitlarones ¹³⁻¹⁰	= ¹⁴⁻¹² and ¹²⁻¹¹	D
12	U	thousand-lire malnourished ¹⁴⁻²	outlandisher ¹⁴⁻¹³ malnourished ¹⁴⁻³	C
13	C	lact-nourished malnourished ¹⁴⁻¹³ the binoculars ²⁰⁻¹⁰	mid-Charleston lact-nourished ¹⁴⁻¹³ malnourished ¹⁴⁻¹²	M
14	M	guild merchants ¹⁶⁻⁴	guild merchants ¹⁷⁻⁶	U
16	FG	guild of merchants	guild of merchants ¹⁷⁻¹⁶	FP

Definitions (in *W3* or noted):

Aten ^{M,R} the first monotheistic God, Egyptian *c.* 1360BC; also Aton

etna: old heating device used in chemistry, named after the volcano

tane: taken *or* tone (Scot. dialect)

etain in the phrase “etian blue”, a very pale green or blue colour, named after tin

Etain a Celtic goddess (from Jeff Grant)

Teian of or relating to Teos, an ancient Greek city

astone^C astonish (obs.)

Easton^R city in eastern Pennsylvania

nerita: marine snail

ratine: a yarn and fabric, sponge cloth

Tiranë^{M,R} same as Tirana, capital of Albania

ratione in legal phrases meaning “by reason of”, eg, *ratione domicilii*

oatenish nonce, resembling or partially oats

throne-dais archaic phrase or compound, throne canopy (see dais, *W3*); also, a throne usually sits on a dais; hyphenated in some Google quotes, eg “holy throne-dais”

ion halters nonce, selectively permeable membranes, filters, columns; chelating agents

north aisle realistic nonce phrase

anchorites: secluded monks or other religious recluses

chain store: phrase listed in *W3*

charleston: a dance popular in the 1920s

detrusional: nonce adjective form of detrusion, an outward or downward thrusting

chitlarone: found under Music in *Crossword Solver* (Parragon, 2002 p.79) but nowhere else including on Google (a misspelling of chitarrone,^M a type of lute?)

thousand-lire pre-Euro Italian money, adjective form, eg an L1000 note; in Google

lact-nourished unlikely nonce, subsisting on milk products, eg, infant mammals

malt-nourished: nutrients via malt (unlisted but see malt in *W3*; appears in a quote on Google unhyphenated); it’s also a nonce humorous word for an all-booze diet

mid-Charleston nonce but necessarily real locales in WV and S C

guild merchants: phrase in *W3* (plural inferred)

guild of merchants unlisted phrase I ran into in a Susan Thorpe article (05-193)

IV. Another Frequence (FREQUENCY seqUENCE)

After completing this study I found on the iNet a letter-frequency study based on a list of common words (45,406 including inflections) rather than on whole text, which gave a very different result (#3):

#3. EISARN TOLCDU GPMHBY FVKWZX JQ.

Compare Cambridge
and Linotype

#2. EATINO RSLHDC MUFPGY YWVKXJ ZQ

#1. ETAOIN SHRDLU CMFGYP WBVKXJ QZ.

Only E’s position is the same in all three frequencies, although N L U F V K X J Q each crash in two of them. Note how strongly the two text frequencies crash near the end. At no position past E do #1 and #3 contain the same letters till the 26th, whereas #2 and #3 have the same after 8, 9, 19 and 25 letters, and #1 and #2 after 3, 6, 11, 14, 15, 20, 21, 22, 23 and 24 letters. (Note that H and Z are in alphabetical positions in #1, M and P in #2 and X in #3.)

This word based sequence would actually have been more appropriate for my study than the text-based versions used since they are so heavily skewed by “the” etc. For example I quickly filled all the blanks up to *n* 9 except *n* 4 with good *W3* transposals. Etc means others

as well, mostly capitalised. (*n*'s 1, 8 and 9 = same as Cambridge.)

<i>n</i>	list-letter words	definitions
2	ie	a Pacific Island screw-pine tree
3	ies; sei; sie etc	pl. of ie; a whale; to strain or to drop (dial.)
4	aies	nonce pl. of exclamation 'Aie!' as a noun
	aise	half word aiseweed (goutweed) and aise-bucket (ash bucket, Eng. Dialect Dict., from Jeff Grant)
	eais	ease ^o (early Scot.)
	saie	say ^o (obs.)
5	arise; raise etc	up; up [<i>ca.</i> synonymograms (see S. Kidd 03-290)]
6	arisen; arsine; reinas etc	up; a gas; fishes
7	Retains nastier retinas stainer! etc	[a polysynogram: He keeps watching porn!]

Manual search for the longer words was too tedious for a lazy man to repeat on #3 so I'll pass the buck to computer savvy readers with long word lists who can, in several minutes rather than several days, probe all three frequency lists, and others.