CONSTRAINED PYRAMIDS

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Word pyramids, in which a letter is added at each step and the letters rearranged, will be familiar to the readers of Word Ways. The aim has been to construct a pyramid with as long a base word as possible, ideally with all words from a single dictionary. Ross Eckler constructed an excellent pyramid, without any plurals, with the 17-letter base word ANTICEREMONIALIST (Word Ways 79146), only slightly marred by the inclusion of the non-dictionary RECLAMATIONIST which seems a perfectly good inferred word. Two pyramids of Kyle Corbin’s appeared in WW88075, both with a 17-letter base word, one pyramid with three plurals and the other with five plurals. In WW2003021, Darryl Francis offered the first pyramid with an 18-letter base word - PRESENTATIONALISMS. This pyramid included five plurals, two of which were straight pluralisations of the adjacent word.

The pyramids offered here are not aimed at having the longest base word. They are special, however, in that each of them abides by one or more of a range of constraints.

Most of the words used below are taken from the Oxford English Dictionary, Second Edition. The sources of non-OED words are given at the end.

Let us begin with a pyramid which describes itself.

A
RA
AIR
RAID
DIARY
MYRIAD
PYRAMID

In these pyramids, each word starts with the same letter, and each word ends with the same letter.

AN
AIN
AIRN
AREIN
AROEIN
AILERON
ACROLEIN
ALECTRION
ALECTORIAN
ALTERCATION
ALTERICATION

PE
PIE
PINE
PINTE
PANTIE
PINEATE
PATERINE
PIGNERATE
PREGANITE
PEREGRINATE
PREGERMINATE
PREIMPREGNATE
In the first of these two pyramids, each word both starts and finishes with the same letter, E. In the second pyramid, the second and penultimate letters are all Es. The letter E does not appear elsewhere in these pyramids.

\[
\begin{array}{ll}
E & RED \\
EE & REED \\
ETE & DETER \\
EATE & TEARED \\
ENATE & SEDATER \\
ETIANE & REPASTED \\
ELATINE & DEPURATES \\
ELOINATE & DEPASTURED
\end{array}
\]

The alternating letters A and N form the sides of the first pyramid. All the words in the second pyramid begin with A and end with AL.

\[
\begin{array}{ll}
AN & AAL \\
NEA & ANAL \\
AEON & ANEAL \\
NEOSA & ANTEAL \\
ARESON & AMENTAL \\
NERVOSA & AMENTIAL \\
AVERSION & ALIMENTAL
\end{array}
\]

So far, we have concentrated on the first and last letters, the second and penultimate letters, and the first, penultimate and last letters. Now we turn our attention to the central letters of the words. As these central letters have to be arranged in a vertical line, each step of the pyramid adds two letters rather than the more normal one letter. The words of the first five pyramids below have one of the five major vowels as their central letter. The vowel in question does not occur elsewhere in the pyramid. The words of the sixth pyramid make a central AEIOU vertical line.

\[
\begin{array}{ll}
A & E & I \\
EAT & NEC & TIE \\
INATE & OC EAN & ATIRE \\
STEARIN & CAMERON & RACIEST \\
ESTUARINE & COSTERMAN & CANNISTER \\
NEUTRALISED & MISCREATION & SANCTIONEER \\
UNSTEWARDLIKE & COMMIS ERATING & NONRESISTANCE
\end{array}
\]

\[
\begin{array}{ll}
O & U & A \\
NOD & CUE & SEA \\
DRONE & SAUCE & ANISE \\
MINORED & ACTUOSE & ESTONIA \\
RANDOMISE & CONSULATE & ISOBEUTANE \\
SEMIDORMANT & INOSCULATED & INTERMODALISM \\
INTERMODALISM & DENTOSURGICAL & SEMIDORMANT
\end{array}
\]
The central letters of the words in these four pyramids are 5-letter sequences of alphabetically-consecutive letters.

CAN
CU BAN
B OUCANE
BO U CAN
BOUNDANCE
COUNT ER BAND
FAR TH ING AE
FARTHING AE
SOLEM NP AAC IE
INTRA VEN OUS

TER
REF IT
FRI GATE
FART HING E
FAR T HINGE
ENTR US I ON
COUNTER BAND
FA R TH IN GAE
SO LEM NP AC IE
IN TRA VEN OUS

AL I
SIM LA
CLAN ISM
CAL SOM I N E
ENCE TRUS ION
COUNTER BAND
FARTH IN GAE
SOLEM NPAC IE
INTRAVENOUS

IRE
ROS IE
INS TO RE
ENTRUS ION
COUNTER BAND
FARTH IN GAE
SOLEM NPAC IE
INTRAVENOUS

The words of these two pyramids have constraints on their first, last and central letters.

POE
PRO LE
PAR O LEE
PET RO LATE
PAR ASO LET T E
TIE
TR IPE
TRA IP SE
TAP P IST RE
TRAP P IST I NE

A variation on single pyramids is to split a word into a number of letter groups and then make a pyramid from each group. In each of these two examples, the letter groups are the same length, seven letters and six letters respectively.

A
A
AN
TA
ANT
EAT
TINA
 RATE
SAIN T
TRE D
INST AR
RED ATE
TRANS LI T E R AT ED
A
I
AT
DIE
TEA
DON
KATE
NODE
TAK ER
CAD IE
TETRA K.
AIDE CA.
HE DRON

Note that the tips of these five pyramids consist of the five vowels in reverse alphabetical order.

U
O
I
E
A
TU
DO
HI
HE
LA
RUT
ADO
HIC
HEP
AIL
UL TR.
ADOL.
ICHO.
CEPH.
ALIC

These two sets of pyramids are constructed from the same base word split into groups of four, six and eight letters, and eight, six and four letters respectively.

I
IT
SO
O
TIE
SOP
A
NO
DIET
PESO
AH
I
SON
TIRED
SCOPE
HAT
I
HI
NOSH
TIDIER
COPIES
HEAT
DI
CHI
HOSAN
IRIDATE
HOSPICE
EARTH
IDE
ECHI.
NOSPHA.
ERITIDAE
ECHI.
NOSP.
HAER IT.
IDAE
Other base words can also be split in more than one way. This is demonstrated well by the 18-letter base word OVERDISCOURAGEMENT. In these first two examples it is split into groups having an equal number of letters.

\[
\begin{array}{cccccccc}
\text{I} & \text{A} \\
\text{DI} & \text{AT} \\
\text{DIE} & \text{RAT} \\
\text{DIRE} & \text{TEAR} \\
\text{DRIVE} & \text{GREAT} \\
\text{CERVID} & \text{GARNET} \\
\text{SCRIVED} & \text{REAGENT} \\
\text{DISCOVER} & \text{TENURAGE} \\
\end{array}
\]

\text{OVERDISCO.URAGEMENT OVERDISCOURA.EMENT}

Alternatively, OVERDISCOURAGEMENT can be split into three and four pyramids, each larger than its predecessor.

\[
\begin{array}{cccccccc}
\text{A} & \text{AN} \\
\text{I} & \text{NAG} \\
\text{IS} & \text{ANGE} \\
\text{O} & \text{SIC RANGE} \\
\text{OR DISC ENRAGE} \\
\text{ROE SODIC RENTAGE} \\
\end{array}
\]

\text{OVER.DISCOU.RAGEMENT OVER.REDIS.COURA.GEMENT}

In the first example below, the groups have progressively fewer letters; in the second, the two outer groups have an equal number of letters so making a symmetrical set of pyramids.

\[
\begin{array}{cccccccc}
\text{O} & \text{A} \\
\text{DO} & \text{AS} \\
\text{DOE} & \text{E SAC} \\
\text{DOVE} & \text{ER SICA} \\
\text{VIDEO RUE E OR CAIUS EM} \\
\text{VOICED UREA EN ORE SCURIA MET} \\
\text{DIVORCE AUGER TEN DOER CARIOUS TEME} \\
\end{array}
\]

\text{OVERDISC. OurAGE.MENT OVERD.ISCOURA.GEMENT}

We have constructed pyramids which abide by a range of constraints. Readers might like to build their own pyramids using these, and perhaps other, constraints.

Sources of non-OED words

ALECTRION (Tertiary Faunas, Vol.1 by A. Morley Davies, George Allen & Unwin 1971)
COSTERMAN (Roget’s Thesaurus)
AROEIN (Chambers English Dictionary)
DENTOSURGICAL, ECHINOSPHAERITIDAE, IRIDATE, OVERDISCOURAGEMENT,
PREGRANITE, SEMIDORMANT, TETRAKAIDECAHEDRON (Webster’s Second Edition)
AMENTIAL, PETROLATE (Stedman’s Medical Dictionary)