TEN-LETTER TRIANGULAR PROGRESSIONS

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In the May 2009 Word Ways, Susan Thorpe introduced the concept of a triangular progression. Partition a six-letter word into groups of one, two and three letters. Calculate the numerical value \((A=1, \ B=2, \text{ etc.})\) of each group, and determine the difference between groups two and one, and three and two. The object is to find words for which the differences are constant; for example, AMOUNT yields \(A=1, \ MO=28, \ UNT=55\) with constant difference \(27 = 28-1 = 55-28\).

This is a generalization of the numerical tautonym, in which the numerical difference between the two halves of a word is zero, as in \(ASS = 39 = ENT\) and \(BIOBIBLIO = 75 = GRAPHICAL\). One can generate three-way or even four-way numerical tautonyms, but the latter are scarce: \(TA \ = \ NG \ = \ LI \ = \ NG = 21\) and \(OVE \ = \ RSE \ = \ CUR \ = \ ELY = 42\).

Susan Thorpe challenged the reader to find a ten-letter triangular progression: I found \(F=6, \ RA=19, \ NCO=32, \ PHIL=45, \) and Sir Jeremy Morse found \(B=2, \ RA=19, \ CHY=36, \ AXIS=53\). One can instead ask for a word with a negative constant difference. Such words are not easy to find, but \(urch=50, \ inl=35, \ ik=20\). \(E=5\) and \(quak=50, \ erl=35, \ ik=20, \ E=5\) qualify. 4-3-2-1 partitions seem to be the most natural ones to consider, but there is no reason that constant-difference words with other partitions do not exist.

In the August 1993 Kickshaws, Dave Morice looked for words with constant differences between successive letters, as in \(F=6, \ O=15, \ X=24\) for which the constant difference is 9. These he termed internal lettershift words. He found one having three identical constant differences, \(D=4, \ I=9, \ N=14, \ S=19\). By wrapping the alphabet \((A=27 \ follows \ Z=26)\), he added \(B=2, \ U=21, \ N=40(14), \ G=59(7), \) and even found one word with four constant differences: \(M=13, \ U=21, \ C=29(3), \ K=37(11), \ S=45(19)\).

The discovery of constant-difference words is exceedingly tedious to carry out by hand, but is ideally suited for the computer, which can quickly search for all such Websterian words (a few dozen?). Word Ways needs a successor to Leonard Gordon, Mike Keith and the late Rex Gooch to quickly generate such studies.