QUEEN'S-MOVE GRAPHING REVISITED

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The February 1996 Word Ways introduced the concept of a queen's-move-graphable word: place the different letters of a word on a chessboard (extended beyond 8x8, if needed) so as to allow a chess queen to move horizontally, vertically or diagonally to spell out the word in question. Words that cannot be queen-graphed--and there are only a handful, even in the second or third editions of the unabridged Merriam-Webster--have graphs that can be reduced by elimination of superfluous nodes (letters) and links (queen's-moves between letters) to one or another of a small set of minimal non-queen graphs. A minimal non-queen graph is one which, if any single further link or node (with associated links) is removed, then becomes queen-graphable.

Most non-queen-graphable words have graphs that reduce to one of two minimal non-queen graphs, diagrammed below. In the first, all letter-pairs but one (AE) are linked; in the second, a sixth letter joins two letters that are non-adjacent. (The integers characterize the number of links joining each letter; in the second, for example, A,C and E have four links apiece.)

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    A                      A + + F
B C D  with BD joined    B C D +    with FE joined
  E      (44433)           E         (444332)
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Words reducible to the first graph include insciences INSEC, intensities INTES, intratrinitarian INTRA, consciencewise ISCEN, stultiloquious UTOIL, untrinitarian INTRA, consubstantiationist INSTA, duodenoenterostomies OENTS, unsubduedness DESUN; words reducible to the second graph include (2-linked letter in lower case) spectrohelioscopic ePIOSC, pseudoprosperous uORPSE, antispectroscopic ePIOSC, antiecclesiastical lAISEC, protransubstantiation nORTIA, duodenopancreatectomy oNACET, intraorganization rOINTA, tracheochromaticerythroblast aRHOEC, pleurolophocerous lUERCO, gastroenterostomies nESORT, transubstantiationalist oNSTAI.

There are a handful of Websterian words that reduce to more complex minimal non-queen graphs. Unconscientiousness and unprosperousness both reduce to the identical graphs below (all queen's moves but CO (or EO) are present)

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  S + + + E                N + + + P
U N C   +    with NE joined   U S E   +    with SP joined
  O + I      (5433333)        O + R      (5433333)
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The words tactinvariant, sacramentarianism, counterinsurgencies and haematospectrophotometer reduce to the following non-queen graphs which are believed to be minimal.

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C N V                        T N S M
T A      with NI joined      I A       with TA joined
  I R       (6444222)          R C        (74333222)
(VR, CN not linked)          (MC, SN not linked)


      R                      R + O H
T + E + I                    + + P +
+   +   +   with UR joined   T + E + M   with HA joined
S + N + C     (65433322)                   (55433332)
  U                                A
(TS, EC not linked)          (MA not linked)
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Leonard Gordon notes that tactinvariant can be attractively S-graphed in the form of a 3-lobed pinwheel or windmill. It is curious how many of the words in this article have religious connotations. Can any reader find another minimal non-queen graph to which a word graph reduces? Or a word graph which reduces to two different minimal non-queen graphs?

It is obvious that any word that has a letter with nine or more other letters adjacent to it is not queen-graphable. Besides the 45-letter lung disease, supradiaphragmatically, epididymodeferentectomies, duodenocholecystostomy and choledochoenterstomy appear to be the only such Websterian words.

The author is much indebted to Leonard Gordon for providing a list of likely words to test for non-queen-graphability (at least five more different bigrams than different letters), and to Dan Tilque for writing a program for testing any word for queen-graphability (as well as the more stringent king-graphability).