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.)

A
B C D with BD joined
E

A + + F
B C D + with FE joined
E (44433)

Words reducible to the first graph include inscences INSEC, intensities INTES, intratenninar INTRA, consciencewise ISCEN, stultiloquous UTOIL, untrinitarian INTRA, consubstantiationist INSTA, duodenoentero- stomies OENTS, unsubduedness DESUN; words reducible to the second graph include (2-linked letter in lower case) spectrohelioscopic EPIOSC, pseudoprosperous uORPSE, antispectroscopic ePIOSC, antiecclesiastical IAISEC, protosubstantiation nORTIA, duodenopancreatectomy oNACET, intraorganization rOINTA, tracheochromatic erythroblast aRHOEC, pleurolophocerous lUERCO, gastroenterostomies nESORT, transubstantiationalist nSTAI.

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)

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

$$\begin{array}{ccc}
\text{CNV} & \text{TAN} & \text{TNM} \\
\text{TA} & \text{with NI joined} & \text{TA} & \text{with TA joined} \\
\text{IR} & \text{(6444222)} & \text{RC} & \text{(74333222)} \\
\text{(VR, CN not linked)} & \text{(MC, SN not linked)} \\
\end{array}$$

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 choledochoenterostomy 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 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).