

MARTIN GARDNER

Puzzle-Games

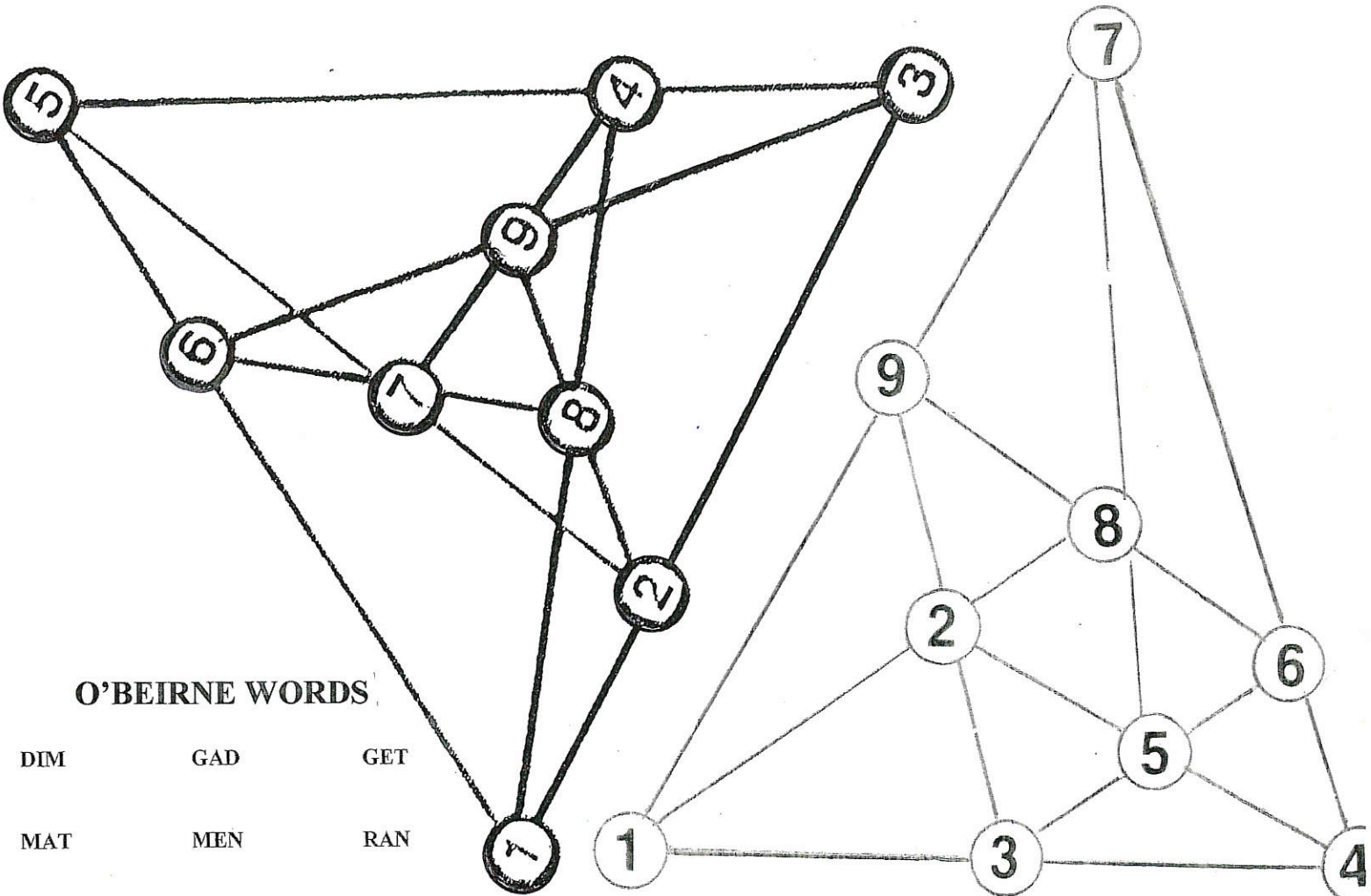
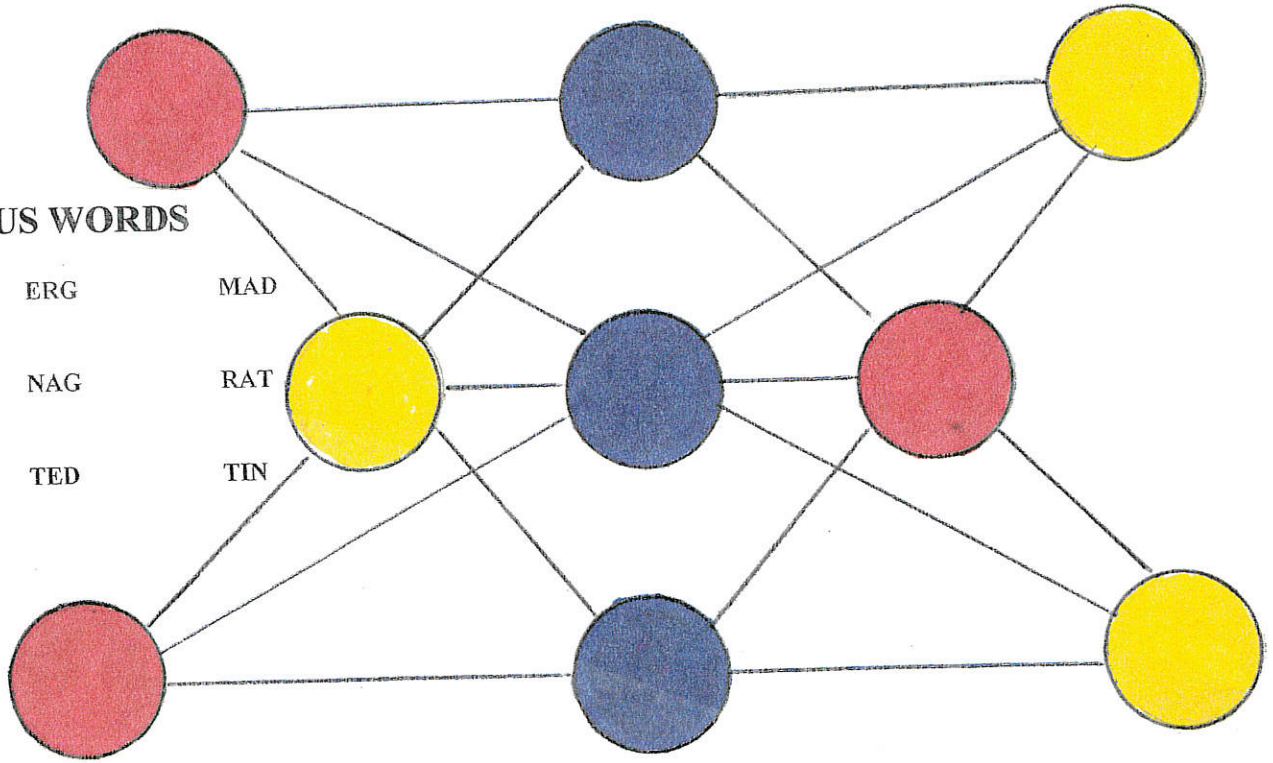
By Stephen Bloom, Lacey Echols, Jeremiah Farrell and Shannon Lieb

Butler University has offered for the last three years a fall semester class on the various exploits of Martin Gardner. The four of us have had the great pleasure of participating in the class and fully expect it to be a regular offering in the coming years.

We note that there are nine different letters in the name MARTIN GARDNER and we will use each letter exactly three times to form several sets of words that will turn out to be (9,3) symmetric configurations. The article "Configuration Games" by Jeremiah Farrell, Martin Gardner, and Thomas Rodgers in *Tribute to a Mathematician*, 2005 AK Peters, Wellsley, MA, edited by B. Cipra, E.D. Demaine, M. L. Demaine and T. Rodgers relates the mathematics of symmetric configurations. The article describes the three different (9,3) configurations, calling their line graphs Pappus's Mousetrap, O'Beirne's Mousetrap, and Mousetrap. For each of these we supply a set of nine Martin Gardner words which as a puzzle are to be placed on the respective graphs so that every line of three has a letter in common.

PAPPUS WORDS

DIG	ERG	MAD
MEN	NAG	RAT
RIM	TED	TIN



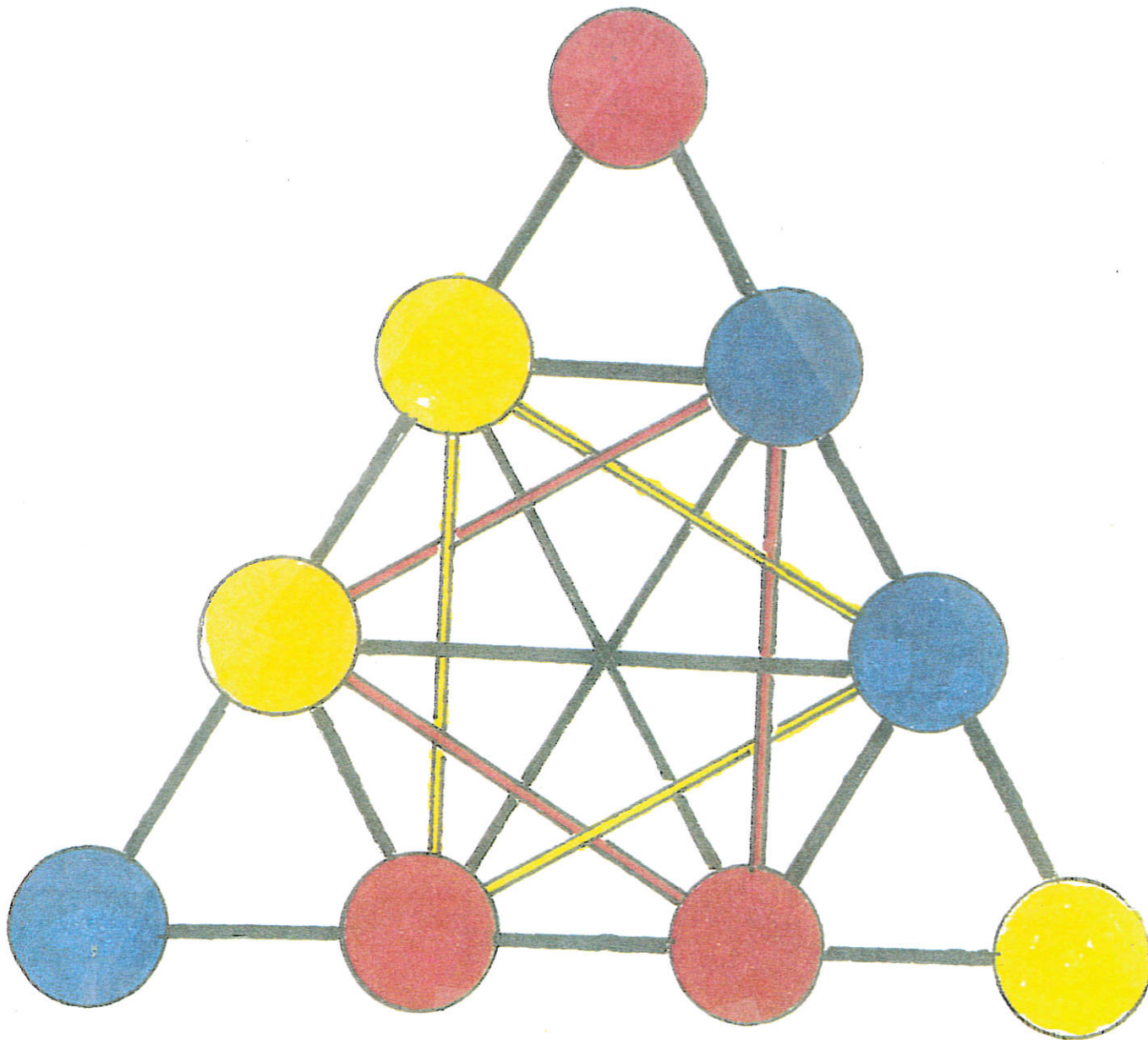
O'BEIRNE WORDS

DIM	GAD	GET
MAT	MEN	RAN
RED	RIG	TIN

MOUSETRAP WORDS

DAM	DIG	END
ERG	MTN	NAG
RAT	RIM	TIE

There are many interesting variations. Pappus can be refigured as equilateral triangles instead of straight lines. That is each of the nodes of the graph is to have a word so that each node of an equilateral triangle has a letter in common.



DIG

ERG

MAD

MEN

NAG

RAT

RIM

TED

TIN

Mousetrap words can be placed on this graph so that every connected node has a letter in common.

DAM

DIG

END

ERG

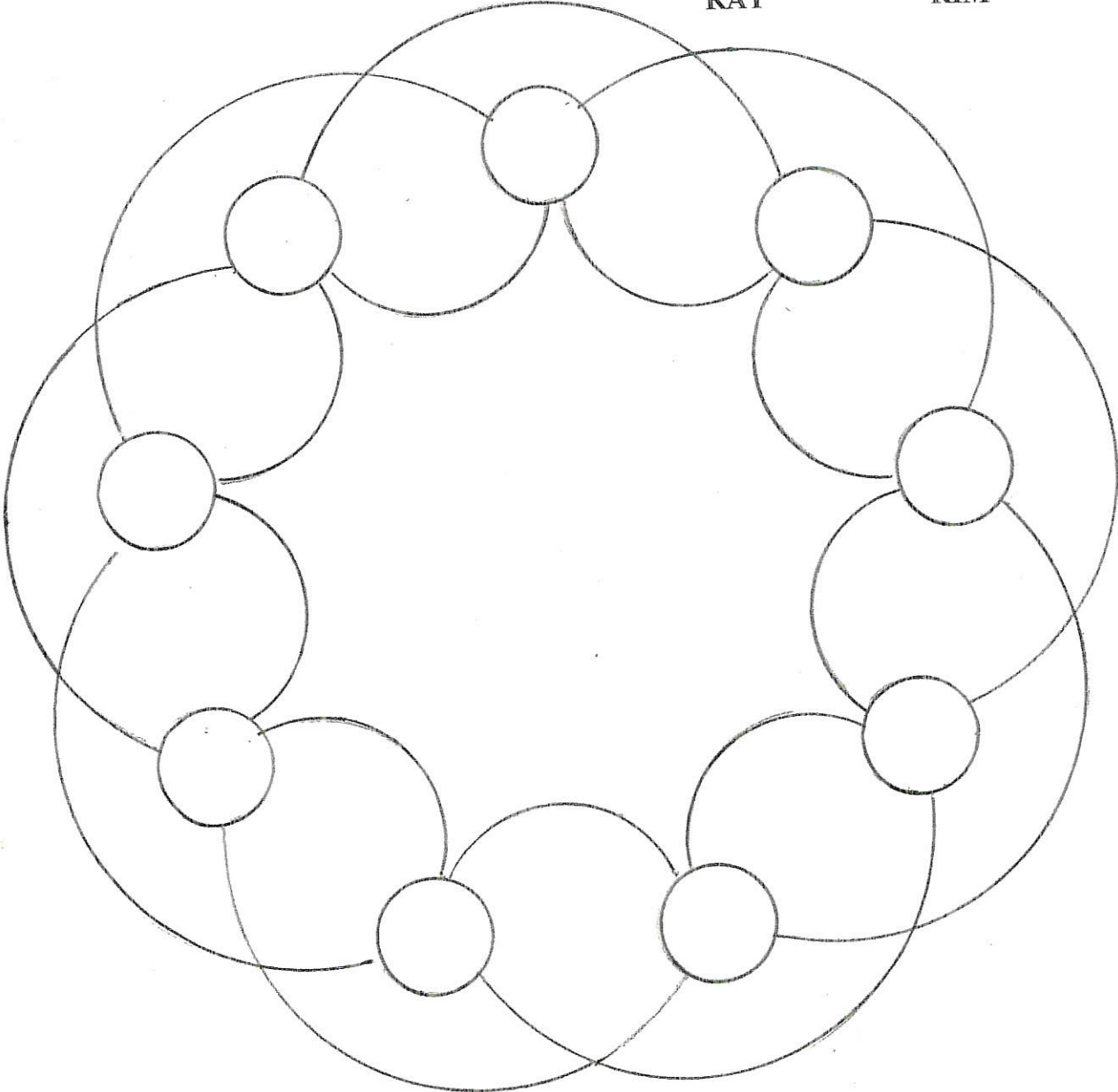
MTN

NAG

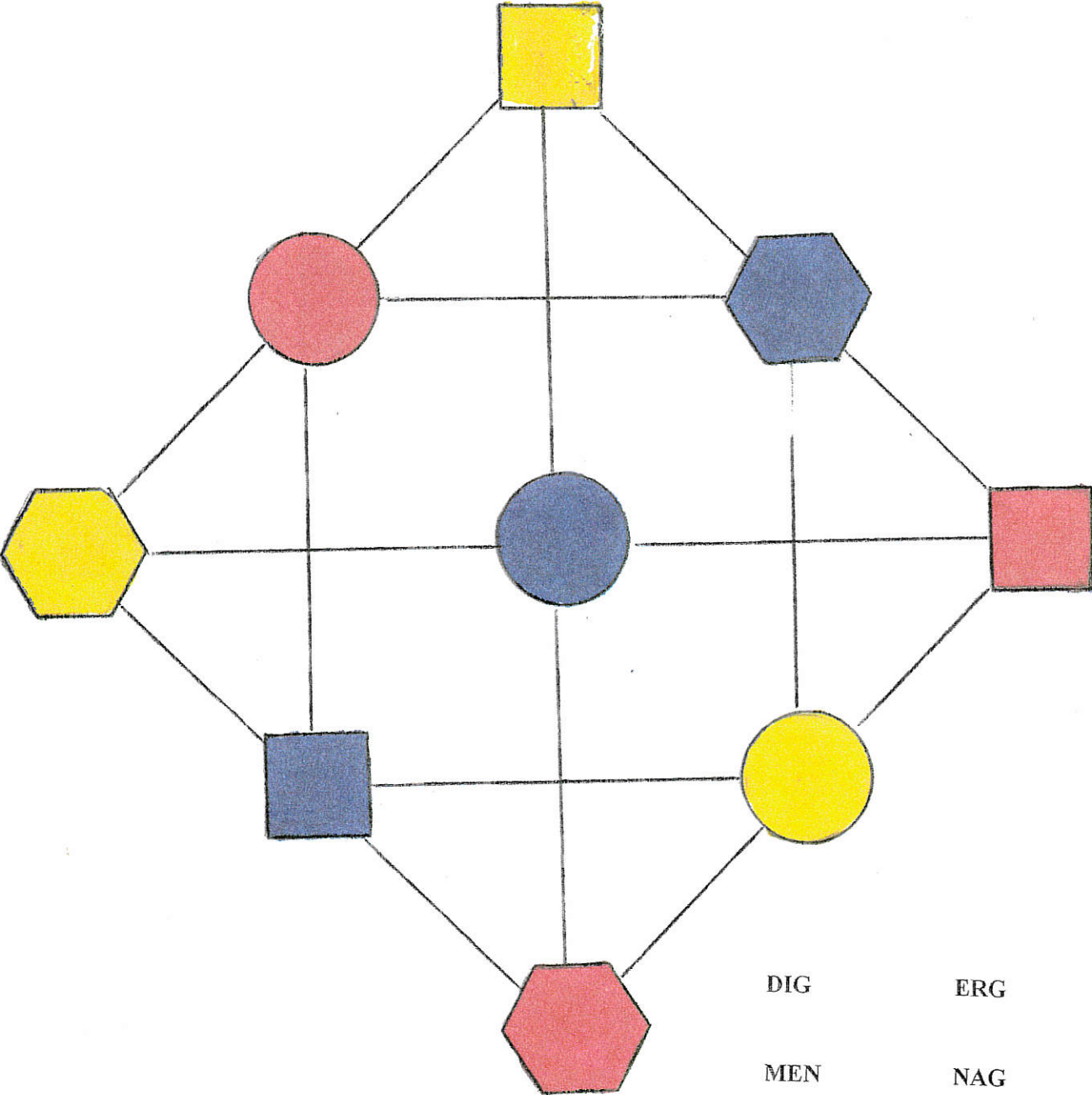
RAT

RIM

TIE



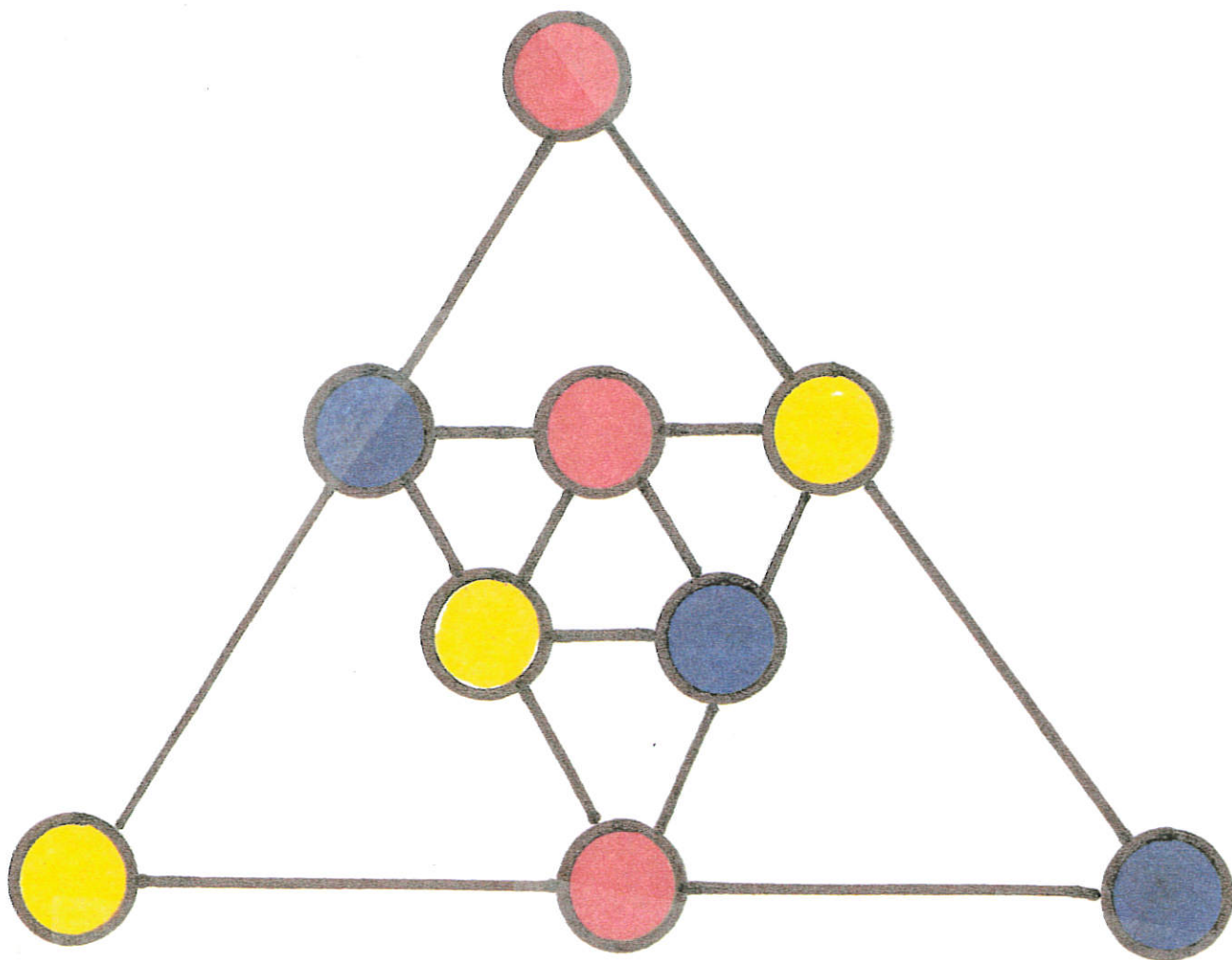
The following is another graph for Pappus. Here the same nine words are to be placed on the nodes so that any two connected nodes have a letter in common. In addition, each set of three shapes is to have a common letter.



- | | | |
|-----|-----|-----|
| DIG | ERG | MAD |
| MEN | NAG | RAT |
| RIM | TED | TIN |

For O'Beirne the following diagram can be used with the name MARTIN. Each letter will be used exactly three times to form the nine chemical symbols which are then to be placed on the nodes so that any two connected nodes have a letter in common.

Am, Americum; Ir, Iridium; Ma, Manganese; Ni, Nickel; Ra, Radium; Rn, Radon; Ta, Tantalum; Ti, Titanium; and Tm, Thulium.



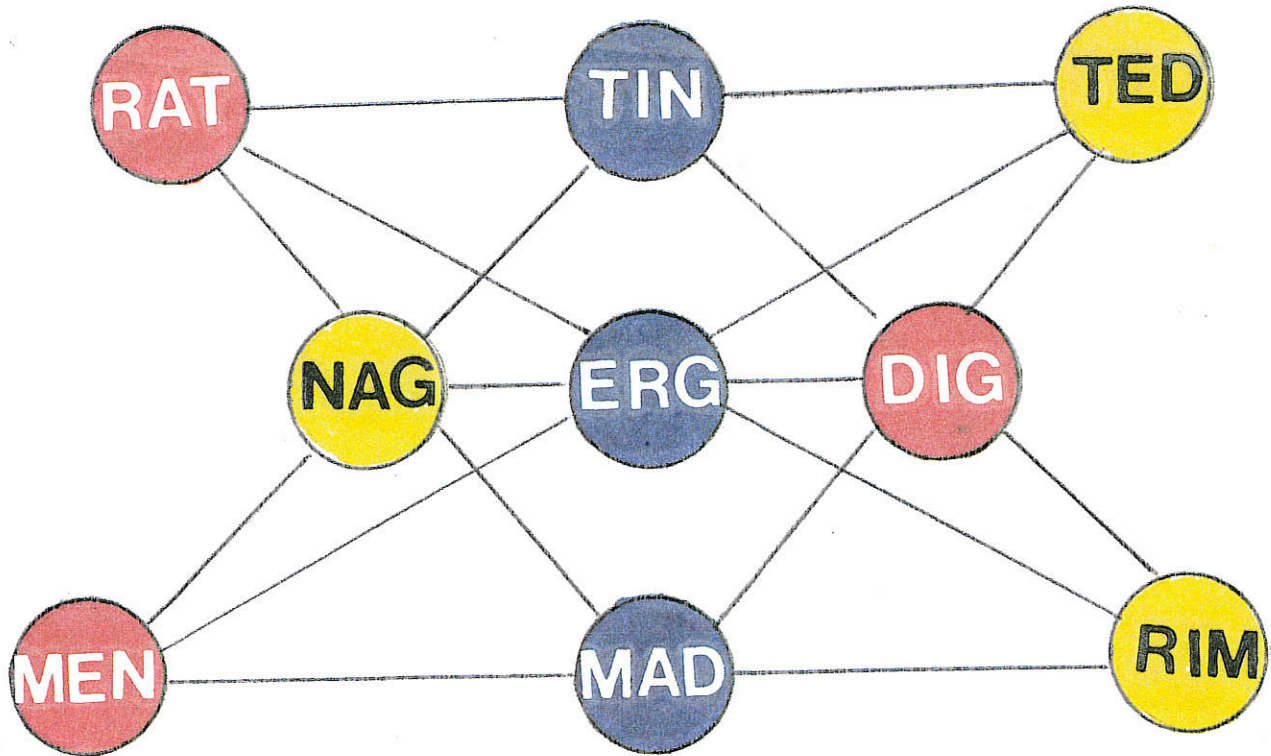
It is also possible to place the words from the former O'Beirne puzzle on the nodes of the above graph so that any two connected nodes have a letter in common.

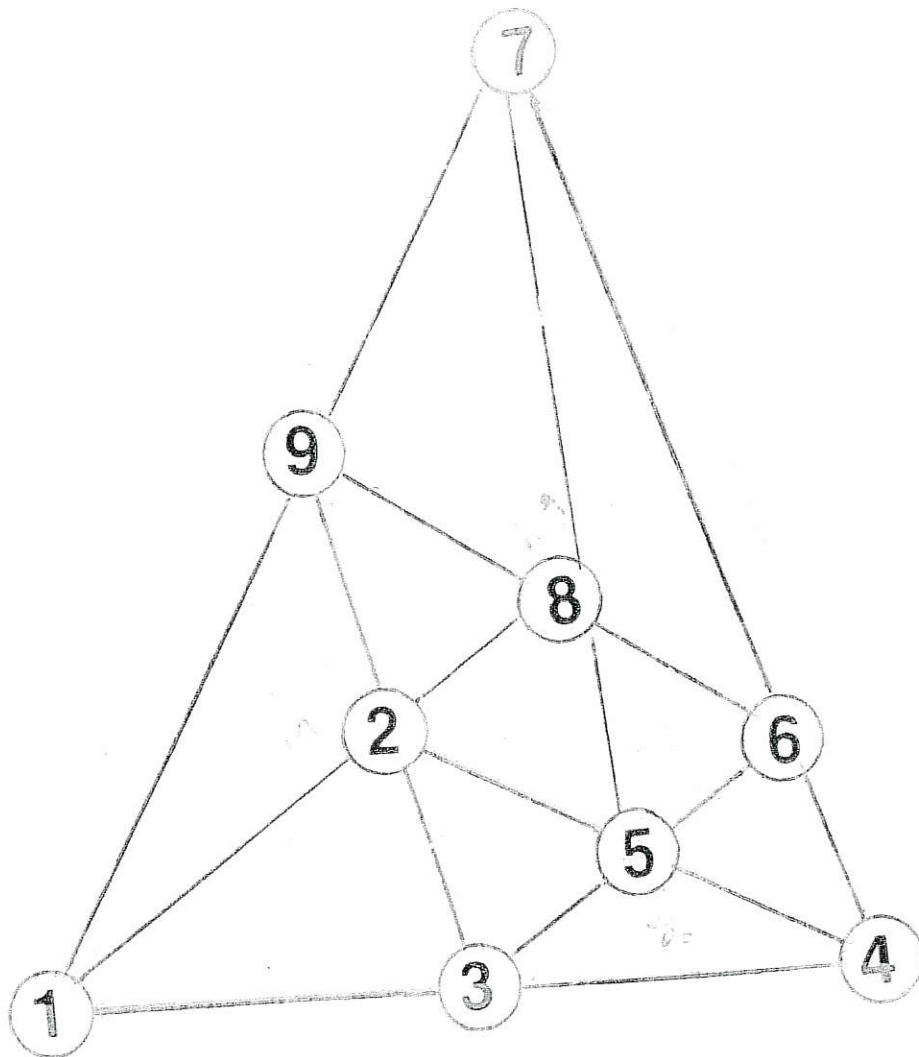
DIM	GAD	GET
MAT	MEN	RAN
RED	RIG	TIN

Possible answers to each puzzle follow.

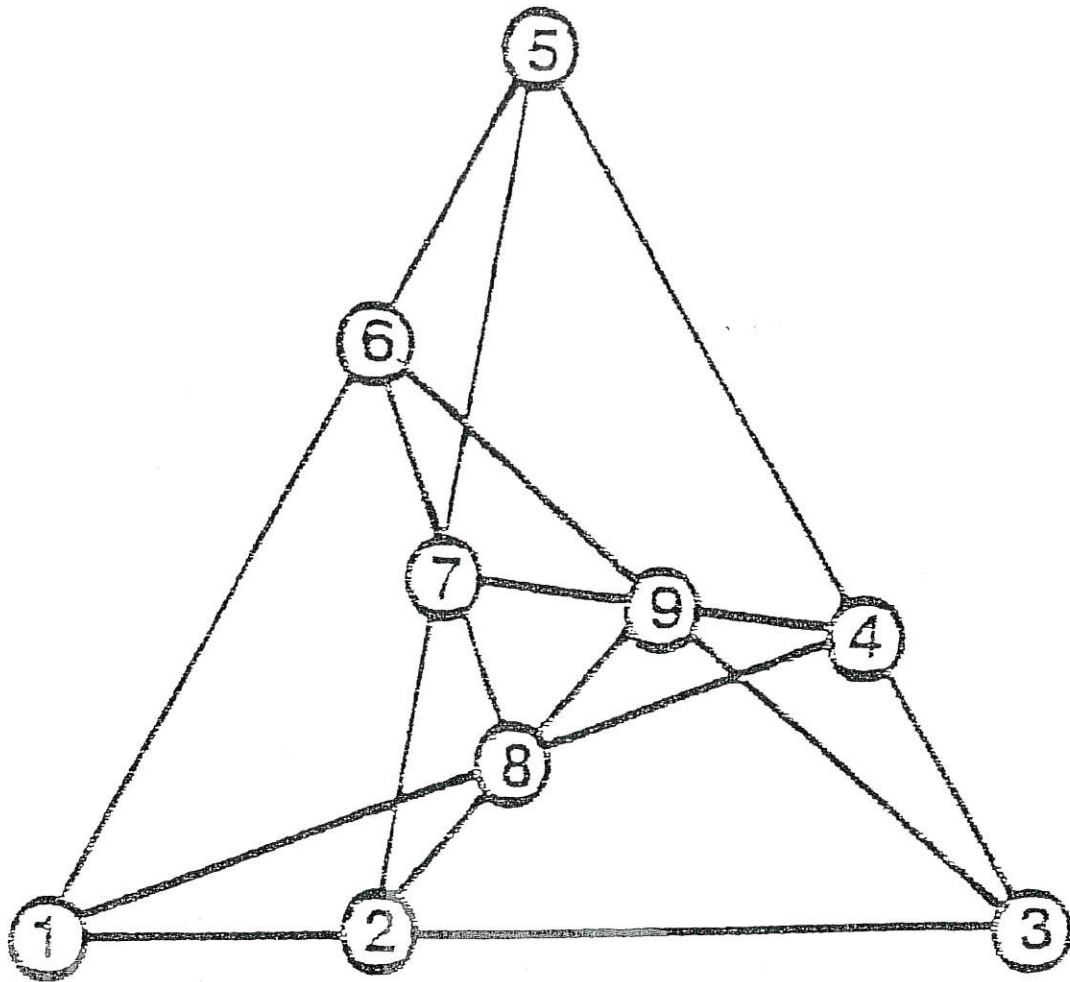
Now for the games. Two players have four distinctive tokens each and alternately play on the nodes of a complete puzzle. If First can select three nodes with a common letter, First wins. Otherwise, Second is awarded the win. It turns out that Second can only force a win on one of the graphs. We will explain later.

Be sure to play the games on completed puzzles so that the location of the letters can plainly be seen. Special note. For O'Beirne any player can win by selecting three of the same color.

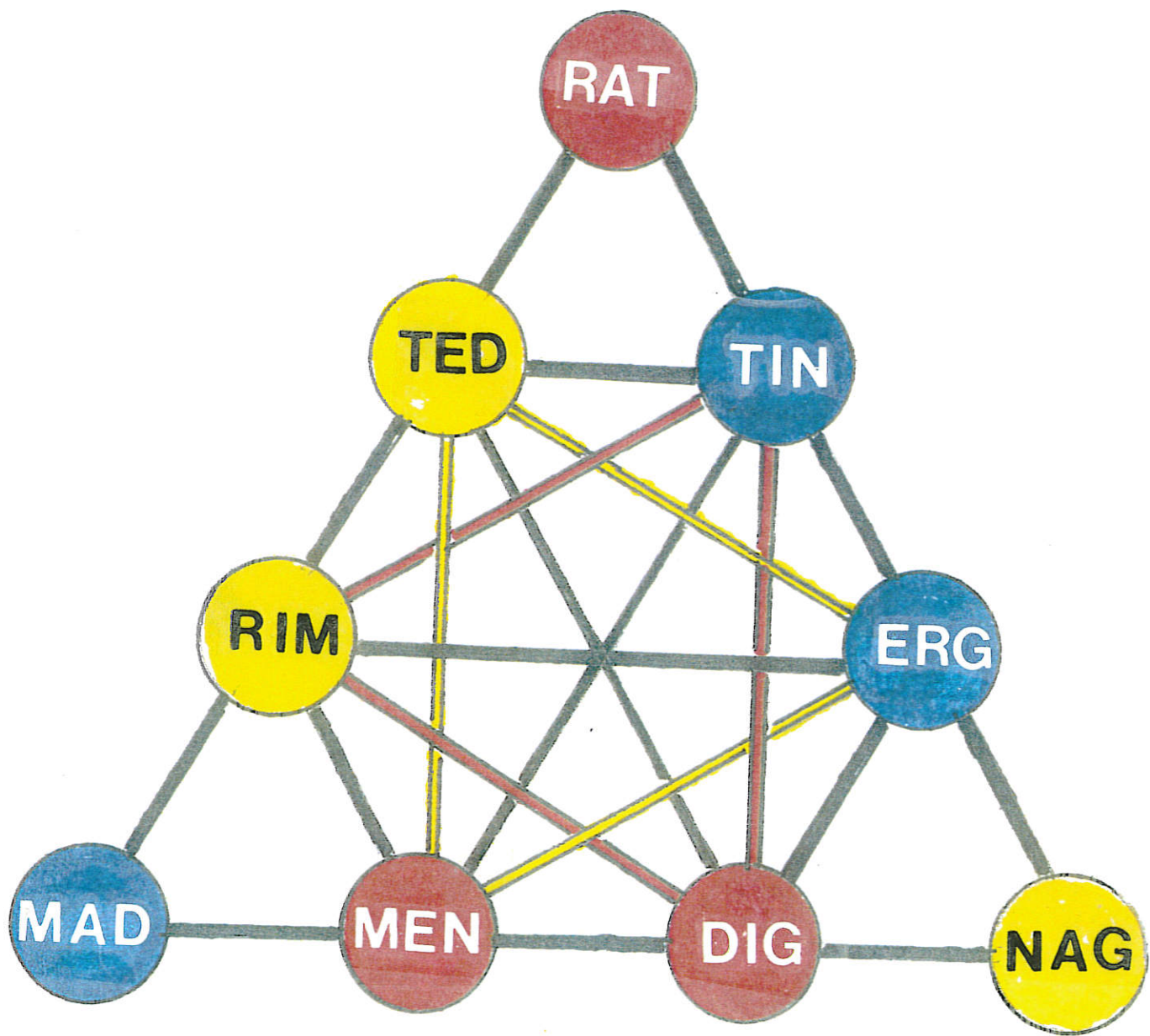


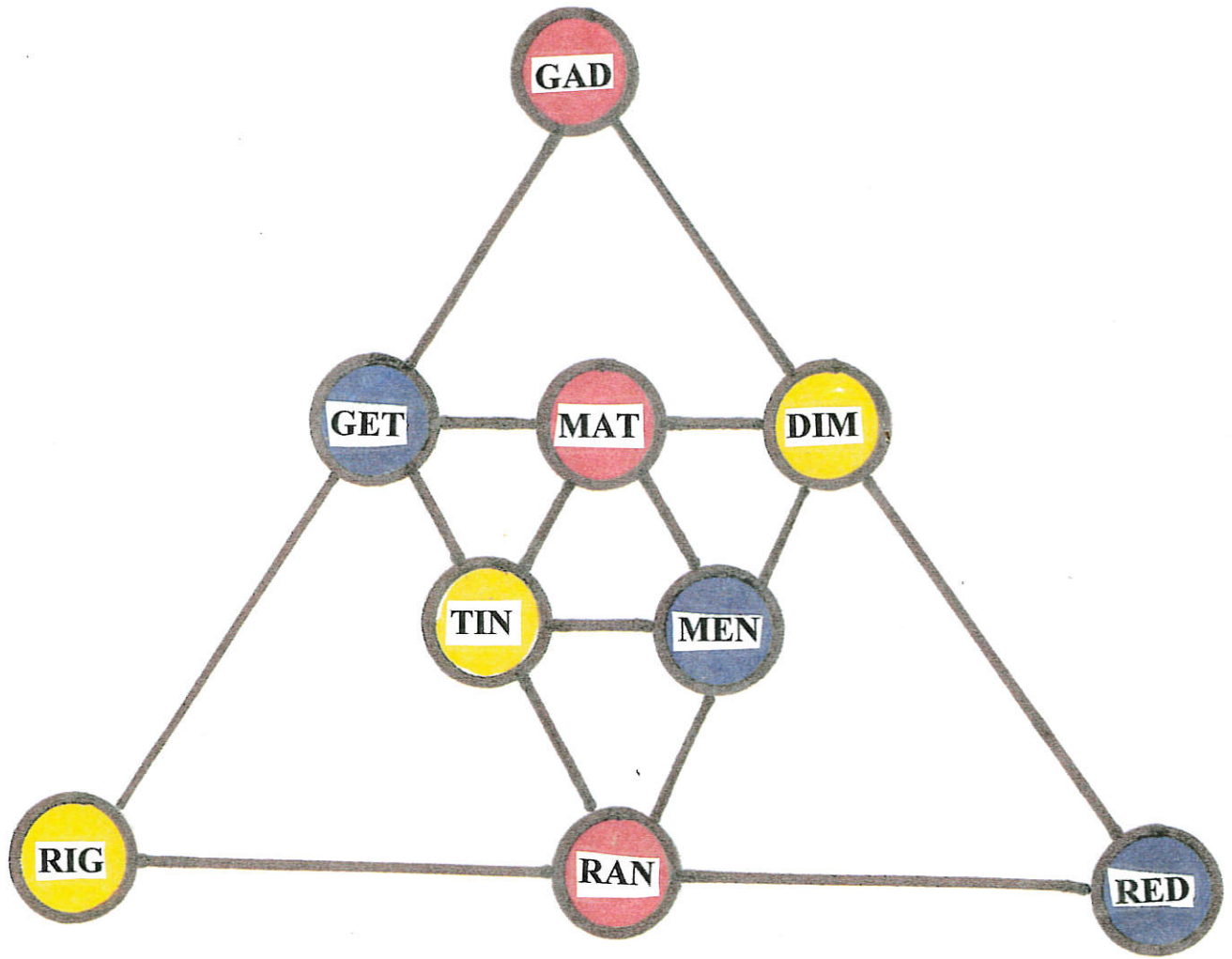


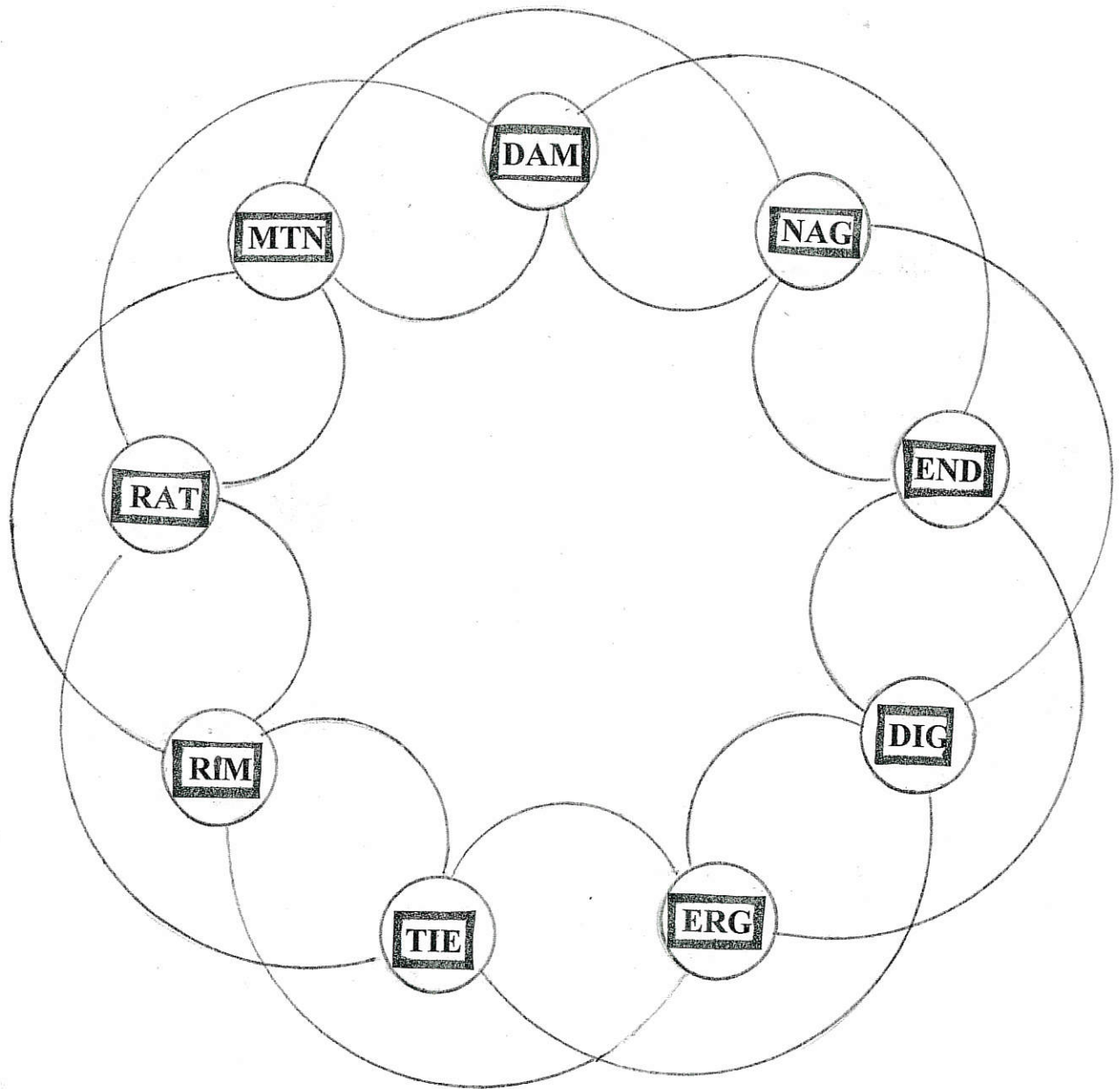
1 DAM	4 DIG	3 END
5 ERG	9 MTN	2 NAG
8 RAT	7 RIM	6 TIE

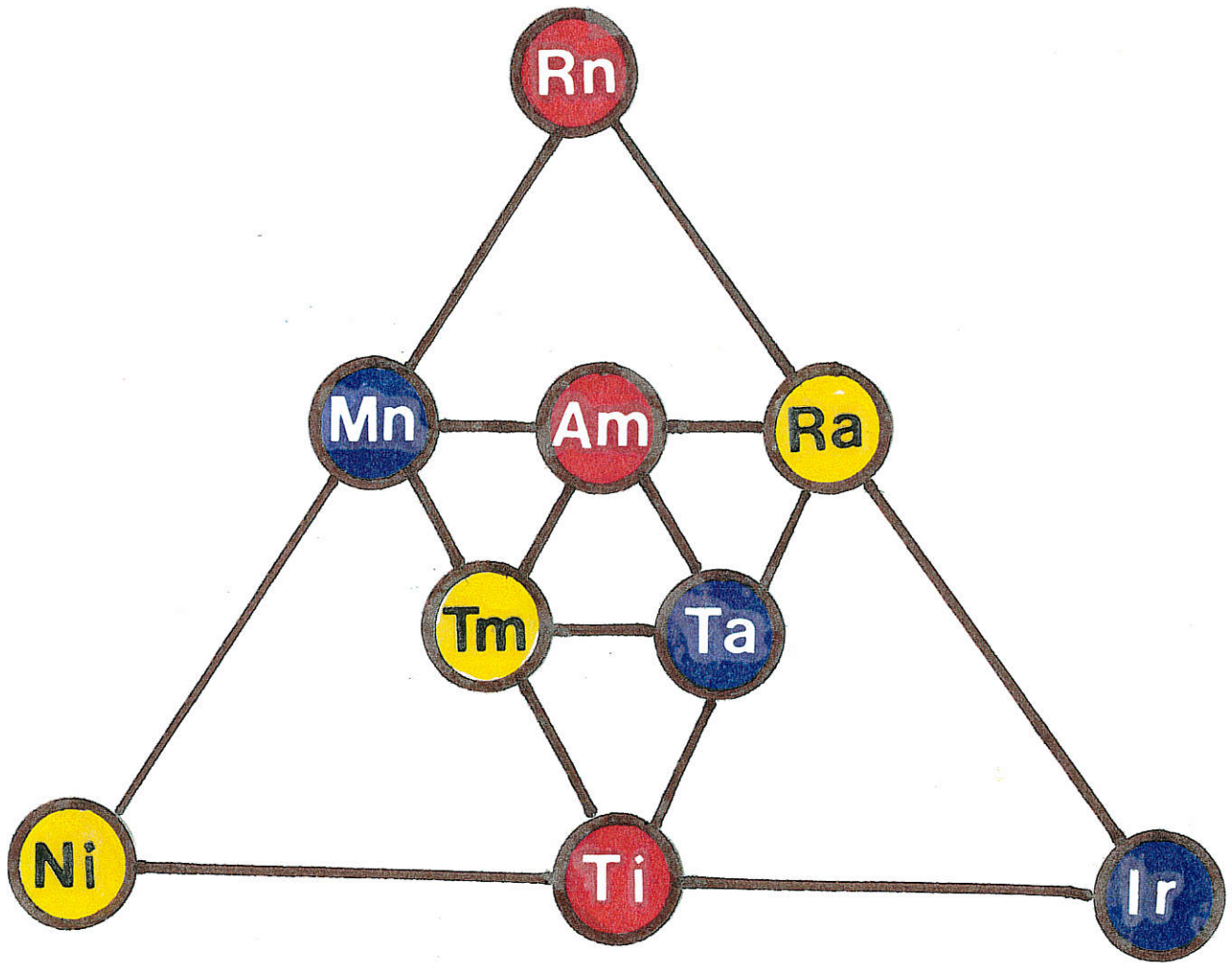


2	DIM	8	GAD	6	GET
1	MAT	3	MEN	4	RAN
9	RED	7	RIG	5	TIN









How to win at the games.

Pappus types. First plays on any color. If Second plays on the same color, First wins by playing the last of that color. If instead Second plays on a different color, First wins by forcing Second to play on another of Second's colors.

O'Beirne's types. First wins by playing one of DIM , RAN, or GET. If Second plays another of these three, First takes the remaining one and wins with careful play. When Second plays any other node on the first turn, First must force Second to waste a move by forcing Second to play a node not connected to Second's initial node. For the MARTIB version the keys are Mn, Ra and Ti.

Mousetrap types. Second can win by playing the next higher number to First's choice (1 if the choice is 9). Careful play after this will force First to use up four moves with no win.