CROSSNUMBER FORMS

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At a local soda fountain last year, Lloyd Quibble, a concrete poet friend of mine, showed me a grid that linked four number words in an unusual way. On first glance, I thought such a creation must be a rare glitch of language, maybe unique. Planning on using Lloyd's grid in Kickshaws, I wrote it down on a napkin. Then I finished my rootbeer float, absent-mindedly wiped the foam off my mouth with the napkin, and stuck it in my pocket. When I looked at it later, the grid was an illegible blur of blue ink. Recently I decided to figure it out on my own, and in the process I found a fountain of grids.

A grid is like a word square, but with gaps. All horizontal and vertical words must cross without forming extraneous words or letter-strings, but they can (and usually do) have space between the lines. Beyond simple grids, there are spinoff forms, such as cubic grids, symmetric chains, and number trees. There are also trivial forms; when the set of number words has a repeated segment, such as TEEN, ILLION, or TWENTY, THIRTY, ONE HUNDRED, TEN THOUSAND, etc., all four segments can be crossed, resulting in a less-significant grid. These have been excluded.

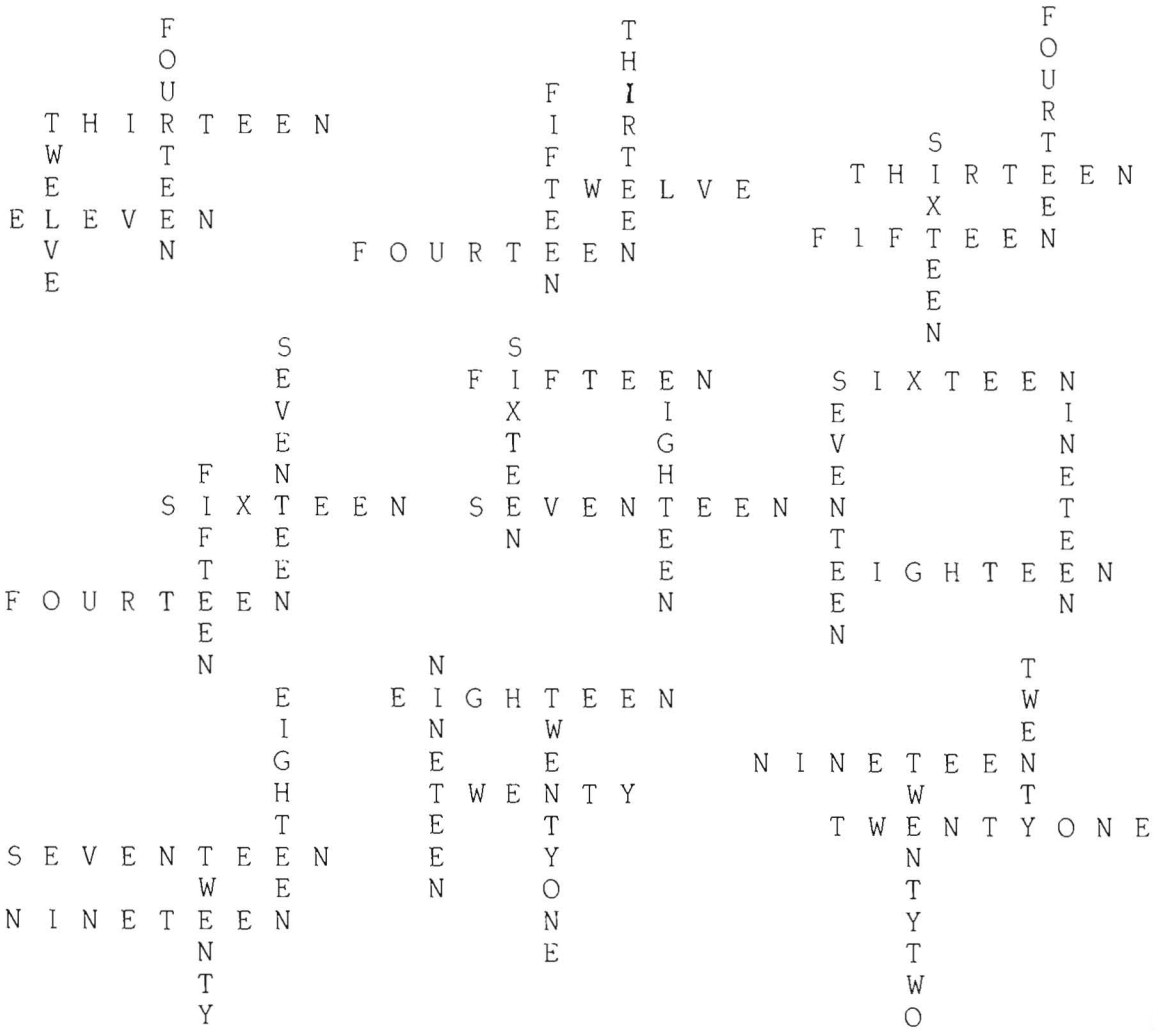
Grids For the numbers 1-12, at least thirteen grids can be formed with sets of four different non-consecutive numbers (1,2,7,12; 1,2,11,12; 1,3,4,7; 1,3,4,11; 3,5,7,8; 3,5,8,11; 3,7,8,9; 3,7,9,10; 3,7,11,12; 3,8,9,11; 5,7,8,10; 5,8,10,11; 7,8,11,12), and two with consecutive numbers. Here are two of each type. The fifth grid uses number adjectives in one of the most elegant patterns of all.

```
    F   S         E       N               N           F I R S T
    O N E     E   L   E I G H T       E I G H T       O     E
    U   V   F I V E       N     E       N     E       U     C
T H R E E     G   V   S E V E N   E L E V E N       R     O
        N   T H R E E                                 T     N
                N                                 T H I R D
```

The set of noun grids offers some challenges: can you find (1) a grid that doesn't rely on SEVEN or ELEVEN, (2) a grid that uses SIX, and (3) a grid made up of four even numbers or four odd numbers?

Moving on to the TEENs, a nearly-complete run of consecutive number grids can be assembled. For each, the numbers can be placed in a clockwise and/or counterclockwise order. Nine examples appear below. One set of numbers defies gridding: can you construct a grid with TEN, ELEVEN, TWELVE and THIRTEEN in any

order?



After this point, it seems almost certain that every set of four consecutive numbers can form clockwise and/or counterclockwise girds. Can you find a set to disprove this?

The next step is to build grids with longer runs of consecutive numbers. In the range of numbers from 1 to 20, the first grid below seems to be the largest. By using number adjectives, an even larger grid can be formed.

Lattices Some grids have a lattice pattern; that is, only one blank space separates neighboring lines. An unusual set of three lattice grids follows. The first repeats TWELVE, which makes it less than ideal, and it uses a number greater than 20. However, it generates two single grids (having the same words across and down). The middle grid uses words of the same length -- possibly the only grid of its kind.

```
  T W E N T Y       T W E N T Y           N
  H   L   W         W   L   W         T H I R T Y
N I N E T E E N     E L E V E N       H   N   W
  R   V   L       N   V   L       N I N E T E E N
  T W E L V E       T W E L V E       R   T   L
  Y   N   E         Y   N   E       T W E L V E
                                    Y   E   E
                                        N
```

Other Number Words The first grid below weaves together a series of fractions. The second grid has adjectives of order or rank. The third uses the non-numerical "numbers" in a deck of cards. The fourth is geometric.

```
      T                       Q           Q
      W     T           S     U       J   U
      O N E H A L F   T E R T I A R Y   A C E
      T     R     I     C       T       C   E
      H     E     V     O       E       K I N G
      I     E     E     N       R
F O U R F I F T H S     D       N                 L
      D     O     I     A       A           P O I N T
      S     U     X   P R I M A R Y           L   N
            R     T               Y       S P A C E
            T     H                           N
            H     S                           E
            S
```

Sums Each of these forms adds up in a special way.

```
      F       T W O       N                   T     E L E V E N
  T W O       H   N       I               O N E     I       L
  W   U   T H R E E   O N E               N I N E   G       E
F O U R   W   E         E I G H T   T E N         H       V
        O N E             G             E       T H R E E
                          H                             N
                          T
```

Symmetric Chain In this form, the grids are connected like the links of a chain. Each grid is a square formed by two different number words (not four as in the earlier grids). This chain links the numbers from 1 to 12, except for the elusive 4. It is symmetrical along the diagonal that runs downward from left to right. Going to the outer limits, an expanded chain can be formed of all number words, including FOUR -- but FOUR has to be the *last word.*

```
      S
    F I V E
  S I X   I
    V     G
    E I G H T
          T E N     S
            N I N E
              N     V
            S E V E N
                  N I N E
                    N     I
                    E I G H T
                        H     W
                        T W E L V E
                              L       I
                              V       G
                              E I G H T
                                    T W O
                                      O N E
                                        E I G H T
                                          G       H
                                          H       R
                                          T H R E E
                                                  E L E V E N
                                                    E
                                                    V
                                                    E
                                                    N
```

Cubic Grid Only six numbers are represented with six-letter words. By placing some of them forwards, some backwards, and some more than once, the outline of a cube can be formed. Like its geometric counterpart, it's an optical illusion; which is the front and which is the back?

```
                  Y R T I H T
              T   T         W W
          R       H       E   E
      I           G     L     N
    H             I V         T
T W E L V E I G H T Y
W       I L       T
E     G   E     E
N   H     V   N
T T       E I
Y T E N I N
```

Number Trees This form connects the words in a set like tree branches to a trunk. In these three examples, the branches increase in value as they climb up the trunk. In the QUINTUPLE and the QUINARY trees, the trunk has the highest value, and in the SINGLETON tree, the trunk has the lowest value.

```
        QUADRUPLE                    QUATERNARY
        U                            U
    TRIPLE                       TERTIARY
        N                            N
        T                    SECONDARY
    DOUBLE                       R
        P                    PRIMARY
SINGLE
        E                    SEXTUPLET
                             I
                        QUINTUPLET
                             G
                    QUADRUPLET
                             E
                 TRIPLET     T
                             O
                        TWIN
```

In the above examples, English number words are balanced together in alphabetic geometry. How does it work for other languages? Or for other sets of words, like the names of the states? Or for any dictionary words? If you try some of your own, first chug a rootbeer float.

OBoy! *Morice*