

A Still Unsolved Problem

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From a series consisting of an endless repetition of the ten digits in order, thus,
 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 . . . ,
 take consecutive elements starting from 1, alternate elements starting from 2, every
 third element starting from 3, and so on. Write the result in square array as
 below, noting that corresponding rows and columns are identical:

1	2	3	4	5	6	7	8	9
2	4	6	8	0	2	4	6	8
3	6	9	2	5	8	1	4	7
4	8	2	6	0	4	8	2	6
5	0	5	0	5	0	5	0	5
6	2	8	4	0	6	2	8	4
7	4	1	8	5	2	9	6	3
8	6	4	2	0	8	6	4	2
9	8	7	6	5	4	3	2	1

Consider the central 5x5 portion of this, and replace the digits 2,4,8,9 and 0 respectively by the letters A, P, O, S and E. We get

S	A	.	O	.
A	.	E	P	O
.	E	.	E	.
O	P	E	.	A
.	O	.	A	S

which at once suggests the old SATOR palindromic word square. Unfortunately the fit is not quite perfect, for to complete the square we find that the two digits 1 and 6 must each represent R, and that 5 must be sometimes T and sometimes N. This idea comes, I am told, from a book in German, *Bella Bulla* by Hans Weis.

The question at once arises: can a palindromic word square be found that is a perfect fit? Or a word square, not palindromic, to fit either of the two other

obvious subsections of our generative 9x9 array? The three subsections have the respective forms:

1 2 3 4 5	9 2 5 8 1	5 0 5 0 5
2 4 6 8 0	2 6 0 4 8	0 6 2 8 4
3 6 9 2 5	5 0 5 0 5	5 2 9 6 3
4 8 2 6 0	8 4 0 6 2	0 8 6 4 2
5 0 5 0 5	1 8 5 2 9	5 4 3 2 1
Direct	Central	Reverse

There are considerable difficulties. All three patterns need a word of the form 50505, and such words are not common in English, though a few exist. Further, in our central array the other words must be reversals; while to complete our direct and reverse forms, we need pairs of words that are anagrams, in one case beginning with, in the other case ending with the same letter. Here are a handful of words, including proper names, that satisfy the 50505 pattern:

ADADA	AJAJA	IJIJI	ULULU
AEAEA	ANANA	ININI	
AIAIA	ARARA	IRIRI	

Tinkering with these (I strongly advise extension of the list), I have found no solution to the direct form. Perhaps some more knowledgeable reader may succeed where I have failed. The central, or palindromic form, our original starting point, is more manageable: here are three passable solutions:

K R A N S	T R A P S	S P I R T
R O D I N	R E N I P	P A G E R
A D A D A	A N A N A	I G I G I
N I D O R	P I N E R	R E G A P
S N A R K	S P A R T	T R I P S

The reverse form is harder to solve, but I have managed to find one solution:

A D A D A
D I T E S
A T R I O
D E I S T
A S O T H

DITES has various meanings, ATRIO is the depression between two cones of a volcano. It is curious that out of five words chosen solely to fit a pattern, two of the remaining three, ADADA and ASOTH, should have come from the Douay Bible, while the other is DEIST.

What can other readers of WORD WAYS do with this problem?