Pfeffermann IXOHOXI Bimagic Square

Miguel Angel Amela
General Pico – La Pampa – Argentina
miguel.amel@gmail.com

Pfeffermann Bimagic Square

G. Pfeffermann built the first *Bimagic Square* in 1890. This *Bimagic Square* was partially published as a puzzle in the fortnightly magazine *Les Tablettes du Chercheur - Journal de Jeux d'Esprit et de Combinaisons*, number 2 of January 15, 1891. Pfeffermann published the solution a fortnight later:

```
56 34  8 57 18 47  9 31
33 20 54 48  7 29 59 10
26 43 13 23 64 38  4 49
19  5 35 30 53 12 46 60
15 25 63  2 41 24 50 40
 6 55 17 11 36 58 32 45
61 16 42 52 27  1 39 22
44 62 28 37 14 51 21  3
```

Magic Sum = 260 ; Bimagic Sum = 11180

Taneja Universal Bimagic Square of Order Eight

Inder J. Taneja defines *Universal Magic Square* (or IXOHOXI) as follows:

- *Upside down*: if we rotate it to 180° degrees, it remains magic square again;
- *Mirror looking*: if we put it in front of mirror or see from the other side of the glass, or see on the other side of the paper, it always remains the magic square;

Taneja built *IXOHOXI Bimagic Squares* in 2010; for example:

```
225555  525222  522255  222522  255252  555525  552552  252225
255225  555552  552525  252252  225522  525255  522222  222555
222222  522555  525522  225255  252525  552252  555225  255552
252552  552225  555252  255525  222255  522522  525555  225222
522525  222252  225225  525552  552222  252555  255522  555255
552255  252522  255555  555222  522552  222225  225252  525525
525252  225525  222552  522225  555555  255222  252255  552522
555522  255255  252222  552555  525225  225552  222525  522252
```

Magic Sum = 3111108 ; Bimagic Sum = 1391692305276

IXOHOXI Universal Sequence

Arranging the set of numbers of the above *IXOHOXI Bimagic Square* in progressive form, we have:

1	222222	9	225222	17	252222	25	255222
2	222225	10	225225	18	252225	26	255225
3	222252	11	225252	19	252252	27	255252
4	222255	12	225255	20	252255	28	255255
5	222522	13	225522	21	252522	29	255522
6	222525	14	225525	22	252525	30	255525
7	222552	15	225552	23	252552	31	255552
8	222555	16	225555	24	252555	32	255555

33	522222	41	525222	49	552222	57	555222
34	522225	42	525225	50	552225	58	555225
35	522252	43	525252	51	552252	59	555252
36	522255	44	525255	52	552255	60	555255
37	522522	45	525522	53	552522	61	555522
38	522525	46	525525	54	552525	62	555525
30	522552	47	525552	55	552552	63	555552
40	522555	48	525555	56	552555	64	555555

To this sequence kind I call it *IXOHOXI Universal,* because the empirical evidence showed that if in any magic square of order eight with the consecutive numbers of 1 to 64 we replace each number by the corresponding progressive number of the *IXOHOXI Universal Sequence*, the result is an *IXOHOXI Magic Square* with all features of the magic square with consecutive numbers. In other words, this sequence is equivalent to the natural arithmetic progression. Other IXOHOXI Sequences are not *Universal*.-

IXOHOXI Bimagic Square

In Memory of G. Pfeffermann

A

552555	522225	222555	555222	252225	525552	225222	255552
522222	252255	552525	525555	222552	255522	555252	225225
255225	525252	225522	252552	555555	522525	222255	552222
252252	222522	522252	255525	552522	225255	525525	555255
225552	255222	555552	222225	525222	252555	552225	522555
222525	552552	252222	225252	522255	555225	255555	525522
555522	225555	525225	552255	255252	222222	522552	252525
525255	555525	255255	522522	225525	552252	252522	222252

Magic Sum = 3111108 ; Bimagic Sum = 1391692305276

This *IXOHOXI Bimagic Square* was obtained by replacing each consecutive number of the *Bimagic Square* of Pfeffermann by the corresponding progressive number of the *IXOHOXI Universal Sequence*.-

Rotations of the Square **A**

B

522225	555255	522252	255525	555222	222555	255552	222522
255255	525222	552255	522555	222252	252522	225525	555552
555522	225555	252552	222222	522525	552255	525252	255225
225222	252252	225255	552522	252225	525552	552555	525525
222552	255522	222525	555252	255555	522222	555225	522255
552252	222225	255222	225552	525255	555525	522522	252555
252525	522552	555555	525225	225522	255252	222255	552222
525555	552525	525522	252255	552552	225225	252222	225252

C

252522	222252	522522	255255	552252	225525	525255	555525
222255	552222	252552	225522	522525	555555	255225	525252
555252	225225	525555	552525	255522	222552	522222	252255
552225	522555	222225	555552	252555	525222	225552	255222
525525	555255	255525	522252	225255	552522	252252	222522
522552	252525	552255	525225	222222	255252	555522	225555
255555	525522	225252	252222	555225	522255	222525	552552
225222	255552	555222	222555	525552	252225	552555	522225

D

252222	225252	252255	525522	225225	552552	525555	552525
525252	255225	222222	252552	552255	522525	555522	225555
225525	555552	522555	552225	252522	222252	255255	525222
555225	522255	555252	222525	522222	255555	222552	255522
552555	525525	552522	225255	525552	252225	225222	252252
222255	552222	525225	555555	255252	225522	252525	522552
522522	252555	225552	255222	555525	525255	552252	222225
255552	222522	255525	522252	222555	555222	522225	555255

B, **C** and **D** are *Bimagic* with Magic Sum = 3111108 and Bimagic Sum = 1391692305276

References:

- Taneja Inder *"Digital Era: Universal Bimagic Squares"*
  http://arxiv.org/abs/1010.2541 ; October **2010.-**
- Boyer Christian *"Multimagic Squares"* http://www.multimagie.com/
- Amela Miguel *"IXOHOXI Magic Squares of Order Eight"*, October **2010.-**