

FURTHER SYMMETRIES IN PERMUTATION-GENERATED PATTERNS

George G. Lugosi

Howard Florey Institute of Experimental Physiology and Medicine

University of Melbourne

PARKVILLE 3052, Victoria, Australia

E-mail: George_Lugosi.hfi@muwaye.unimelb.edu.au

In my previous article in our Journal (Volume 3, Number 1, 1992) and in my lecture of the Hiroshima Symposium (Japan, 17-24 of August, 1992) I made an attempt to introduce an endlessly growing sign-system, in which the development and the “relatives” of the individual signs give opportunities to interesting analogies and logical investigations.

It is obvious that the number of signs in a table and in a full block are growing at really alarming speed : in the “world” where we create the signs of $n \times n$ squares we can create $(n!)^2$ signs. We can arrange them in tables (within a table the column-vectors are the same, and the row-vectors are changing from 1,2,3,...,n to n,n-1,n-2,...,1), and the tables into a full block. It is obvious that the number of tables in a block are equal with the number of signs in a table, knowing the rules of creation and arrangements. They were given in the above-mentioned article. See the full block of the 4×4 “world” as an example. (Fig.1.)

Also mentioned and explained there the important roles of the diagonally symmetric (ds) signs. They are really very important pointers in the endlessly growing ocean of signs. Here I should like to mention again that only ds signs can have ds “relatives” or “descendants”. If we use the signs of the $n \times n$ world as templates to create the signs of the $(n+1) \times (n+1)$ world then we can follow the really fascinating evolution and metamorphoses of this form-world



Fig. 1.

The ds signs, in which the column- and row-vectors are equal, show the position of the table in the block, using the inverse central-symmetric positions.

Let us take the example of the 3 x 3 and 4 x 4 worlds, because they are small enough and easy to handle. If we use any sign of the 3 x 3 block, we can create 16 signs as its “descendants” in the 4 x 4 block. If it is a ds sign, then four of the “descendants” will be ds signs also. This will happen when we will use the points of the ds axis.



We can see here the four 4 x 4 ds signs, created from one of the 3 x 3 ds signs

Within the frames of the 4 x 4 signs we can recognise (in the “negative space”) the original 3 x 3 sign. On this way, very similarly to the world of biology, we can use the signs as templates, and can build up the next level (or generation) of signs

As we have seen on Fig.4 of my previous article, the 3 x 3 world consists of 36 signs. Using those as templates, we can create 16 new signs from each in the 4 x 4 world. The result is the complete block of the 576 signs in the 4 x 4 world. On the same way we can go on, and we can realise that however we can create the new and new blocks, but we can not see them. What does it mean? Well, if we use 5 mm square to build up the signs and leave the same size of gaps between them, than the length of the individual tables (NOT the blocks!) are

N	Number of Tables	Length of one Table
4	24	145 mm
5	120	715 mm
6	720	4.195 m
7	5,040	28.795 m
8	40,320	226.795 m
9	362,880	2.016 km

If we go on , then we can see that if N=10 then the length is 19.958 km, if N=12 then 2594.592 km, and if N=16 then about 75% of the Sun-Earth distance. It shows, that even if

the N is a small integer, we are unable to see even one full table. This makes it necessary to use the d_s signs for orientation, finding out where is the table within the block, and at what type of “logical place” are we.

A very interesting (and promising) direction is to find the different signs (on different logical places) in the folks-art. It is obvious that it can not be only “by chance” to find on a cross-stitched shirt from the same logical place a sign in the case $n=3, 4$, and 5 . It seems to be the case, that the signs and motives of different cultures (specially old cultures) are organised around certain logical places of this sign-system.

One more little remark : to deal with this “organically” growing system is similar to learning swimming or using a bike. To read a book about it (or an article) doesn't help, you have to try it yourself.