Table 1 The 23 structurally different Solatino patterns in Latin squares of order 5 including the numbers and the colours in which they occur in the puzzle

from: www.latinsquares5x5.wordpress.com : **How many structurally different latin squares of order 5 do exist?** This table to be used together with *table 2: All 192 structurally different latin squares of order 5…* (www.latinsquares5x5.files.wordpress.com/2015/07/latintables1.pdf)

Twofold symmetrical patterns with a centre (= central dot)

1

o				
	o			
		o		
			o	
				o

1 x black

2

	o			
o				
		o		
				o
			o	

1 x black

3

o				
			o	
		o		
	o			
				o

1 x black

4

	o			
				o
		o		
o				
			o	

1 x black

Singularly symmetrical patterns with a centre

5

o				
				o
		o		
			o	
	o			

2 x black

6

o				
	o			
		o		
				o
			o	

2 x black

Asymmetrical pattern with a centre

7

o				
			o	
		o		
				o
	o			

4 x black

Singularly symmetrical patterns without a centre

8

	o			
o				
				o
			o	
		o		

1 x red
1 x yellow

9

o				
	o			
				o
			o	
		o		

1 x red
1 x yellow

10

o				
				o
			o	
		o		
	o			

1 x green
1 x blue

11

				o
		o		
	o			
			o	
o				

1 x green
1 x blue

12

o				
			o	
				o
	o			
		o		

1 x red
1 x yellow

13

	o			
o				
			o	
		o		
				o

1 x green
1 x blue

14

o				
	o			
			o	
		o		
				o

1 x green
1 x blue

15

			o	
	o			
				o
o				
		o		

1 x red
1 x yellow

Asymmetrical patterns without a centre

16

o				
		o		
				o
			o	
	o			

1 x red
1 x yellow
1 x green
1 x blue

17

o				
		o		
				o
	o			
			o	

1 x red
1 x yellow
1 x green
1 x blue

18

			o	
o				
	o			
				o
		o		

1 x red
1 x yellow
1 x green
1 x blue

19

		o		
	o			
				o
o				
			o	

2 x red
2 x yellow

20

o				
	o			
			o	
				o
		o		

1 x red
1 x yellow
1 x green
1 x blue

21

o				
			o	
				o
		o		
	o			

1 x red
1 x yellow
1 x green
1 x blue

22

o				
		o		
			o	
				o
	o			

2 x green
2 x blue

23

	o			
o				
			o	
				o
		o		

1 x red
1 x yellow
1 x green
1 x blue

The 23 patterns form in fact a two-dimensional representation of the 5! = 120 permutations of the row 12345. Explanation:

Consider pattern 23. This pattern does not contain any symmetry. Pattern 23 in the orientation as shown above can be written as 21453 in the sense that the dot in the upper row stands in position 2, the dot in the second row in position 1, the dot in the third row in position 4, in the fourth row in position 5, in the fifth row in position 3. And there it is: 21453. When you rotate the square 90° clockwise and do the same , you get 45132. Rotating again two times 90° you get 31254 and 43512. Now turn the pattern upside down, and do the same. You get 21534, 45213, 23154 and 35412. In total eight permutations of 12345.

Now consider pattern 15. One of the diagonals forms a symmetry axis. The shown pattern can be written as 24153. Rotation 90° clockwise gives 35142, 31524 and 42513. Turning upside down (= reflection), and then rotation again gives respectively 31524, 42513, 24153 and 35142, the same codes as the former four. Four permutations.

And now pattern 1. Both diagonals form a symmetry axis. It is easy to see that the pattern gives only the codes 12345 and 54321. Two permutations.

We can conclude that the 9 asymmetrical patterns contribute in total an amount of 9 x 8 = 72 permutations to the 120. The 10 singular symmetrical patterns contribute 10 x 4 = 40 permutations, and the 4 two-fold symmetrical pattern contribute 4 x 2 = 8 permutations. In total exactly the 120 permutations of the row 12345. With which has (also) been demonstrated that there cannot be more than 23 Solatino patterns in Latin squares of order 5.