

Table 1. Enumeration of possible patterns in three different kolam spaces. Calculations of the number of possible patterns in a space-filling square loop kolam drawn on a rectangular matrix after Nagata (2006). Orthogonal pattern numbers are calculated per a slight modification of Nagata's 2006 formula, 2^{c_o} , where $c_o = (2nm - n - m)$, rather than $2^{c_o} - 1$. Diagonal pattern numbers are calculated as 2^{c_d} , where $c_d = (n - 1)(m - 1)$. And, $c_e = c_o + c_d$. These numbers do not exclude rotational duplicates, chiral duplicates, or multi-loop patterns.

Matrix	Orthogonal		Diagonal		Extended lexicon	
$n \times m$	patterns	c_o	patterns	c_d	patterns	c_e
2×2	16	4	2	1	32	5
2×3	128	7	4	2	512	9
2×4	1,024	10	8	3	8,192	13
3×3	4,096	12	16	4	65,536	16
3×4	131,072	17	64	6	8,388,608	23
3×5	4,194,304	22	256	8	1,073,741,824	30
4×4	16,777,216	24	512	9	8,589,934,592	33
4×5	2,147,483,648	31	4,096	12	8,796,093,022,208	43

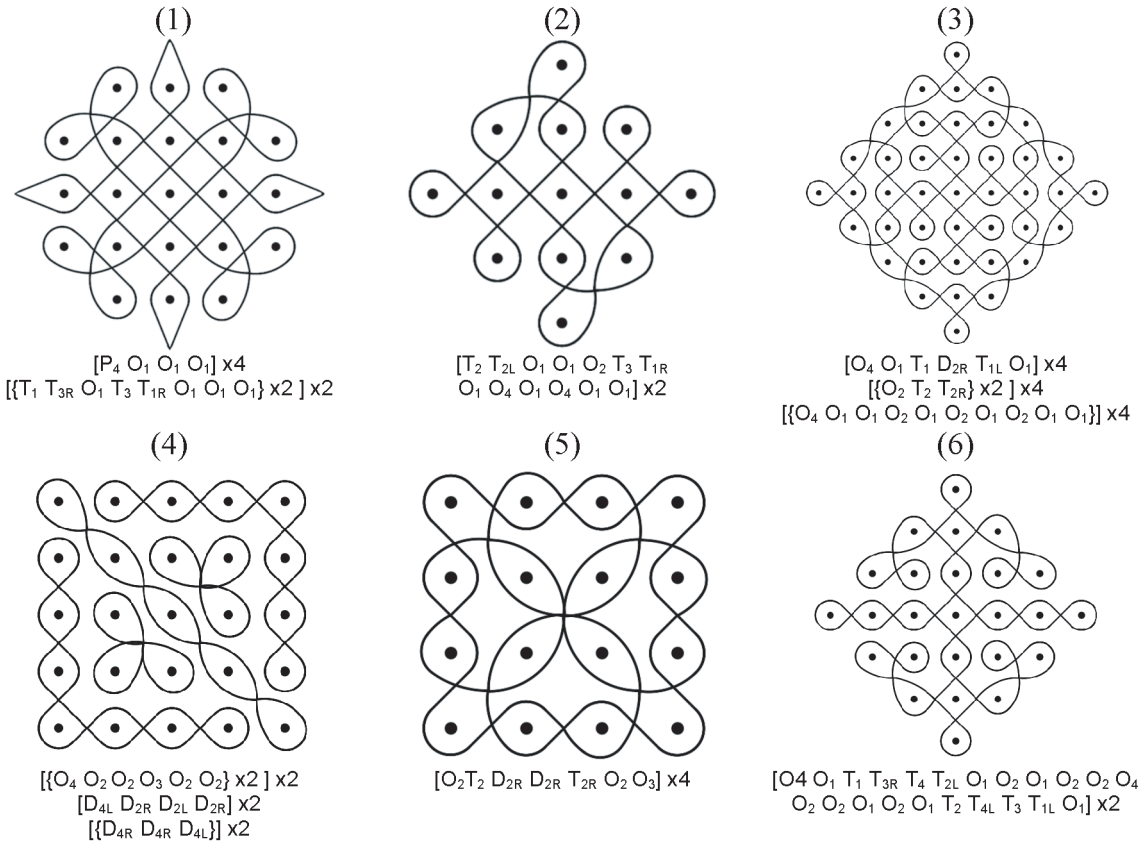


Fig. 10. A sample of extended lexicon SLK patterns. All patterns are from Tamil Nadu, and require the extended SLK lexicon. Sequences of gestures in square brackets $[]$ each represent a loop, while those within braces $\{\}$ represent sub-loop sequence repetitions. Both loops and sub-loop sequences have repetitions denoted as “ $\times 4$,” for example. Pattern 5 and 6 match the patterns Figs. 3a3 and 3a2, respectively.

gestures to the von Neumann neighborhood (from the focal dot a gesture may only connect to dots directly above, below, right or left). The addition of diagonal and transitional gestures allows kolam gestures to move in the Moore neighborhood (from the focal dot a gesture may connect to dots above, below, right, left and all four diagonal directions), creating a much larger number of possible patterns within any size matrix.

The empirical value of the extended lexicon is in the increased representational depth it permits. Scholars can now more precisely encode and analyze the kolam patterns than

appear in the practice of kolam artists. Figure 9 displays a sample of kolam patterns that break the kolam rules of previous studies, but are possible under the new lexicon. Finally, the new lexicon has relaxed previous constraints on kolam representation, and demonstrates how ‘breaking the rules’ of previous kolam studies can be a valuable analytical pursuit.

5.1 Illustrations

The extended lexicon enables better empirical studies, since it allows scholars to more precisely represent, recreate and analyze the kolam patterns as they are practiced by ko-