Learning Perceptual Kernels for Visualization Design

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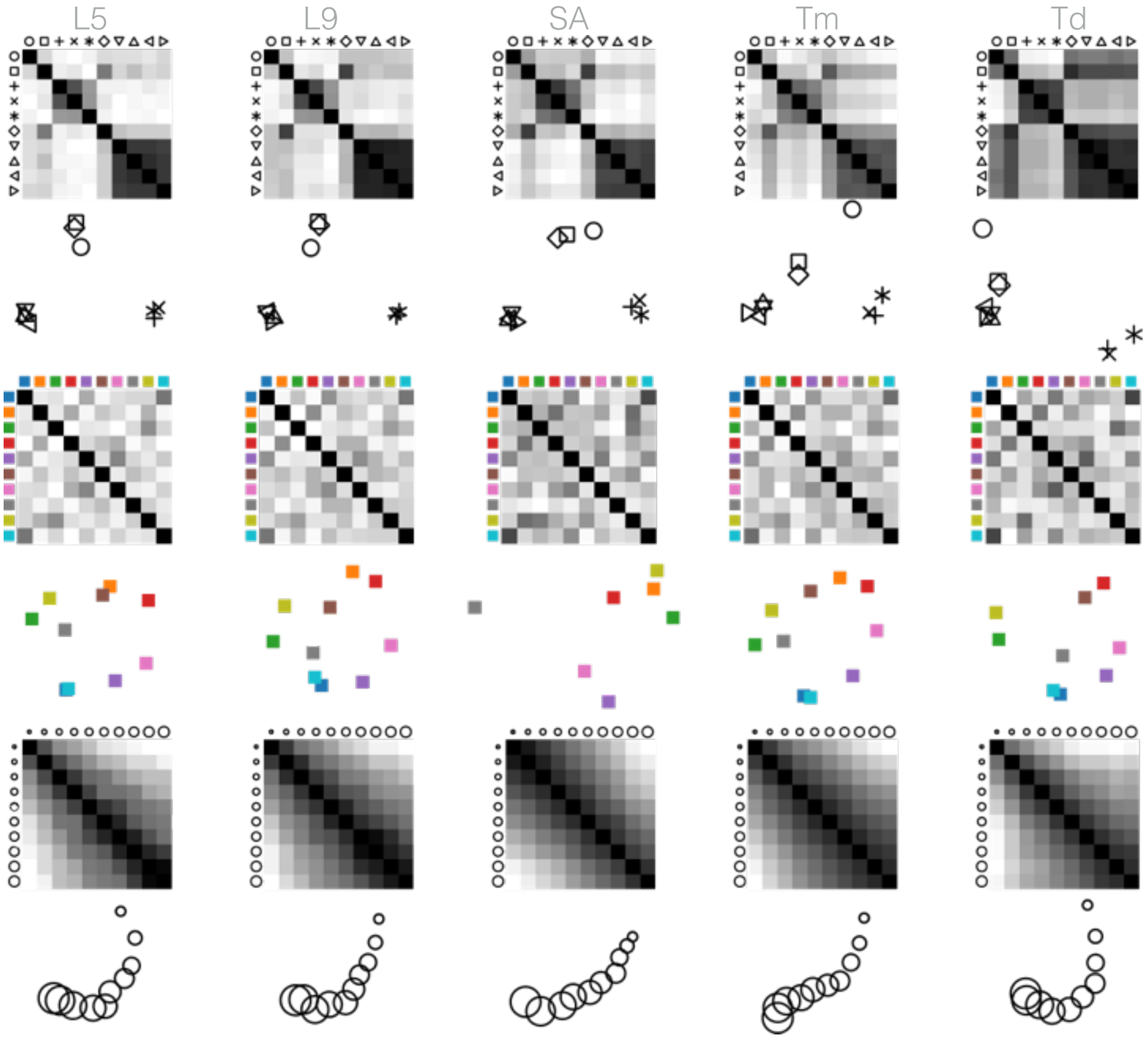
Supplementary Material for InfoVis'14 Submission #161

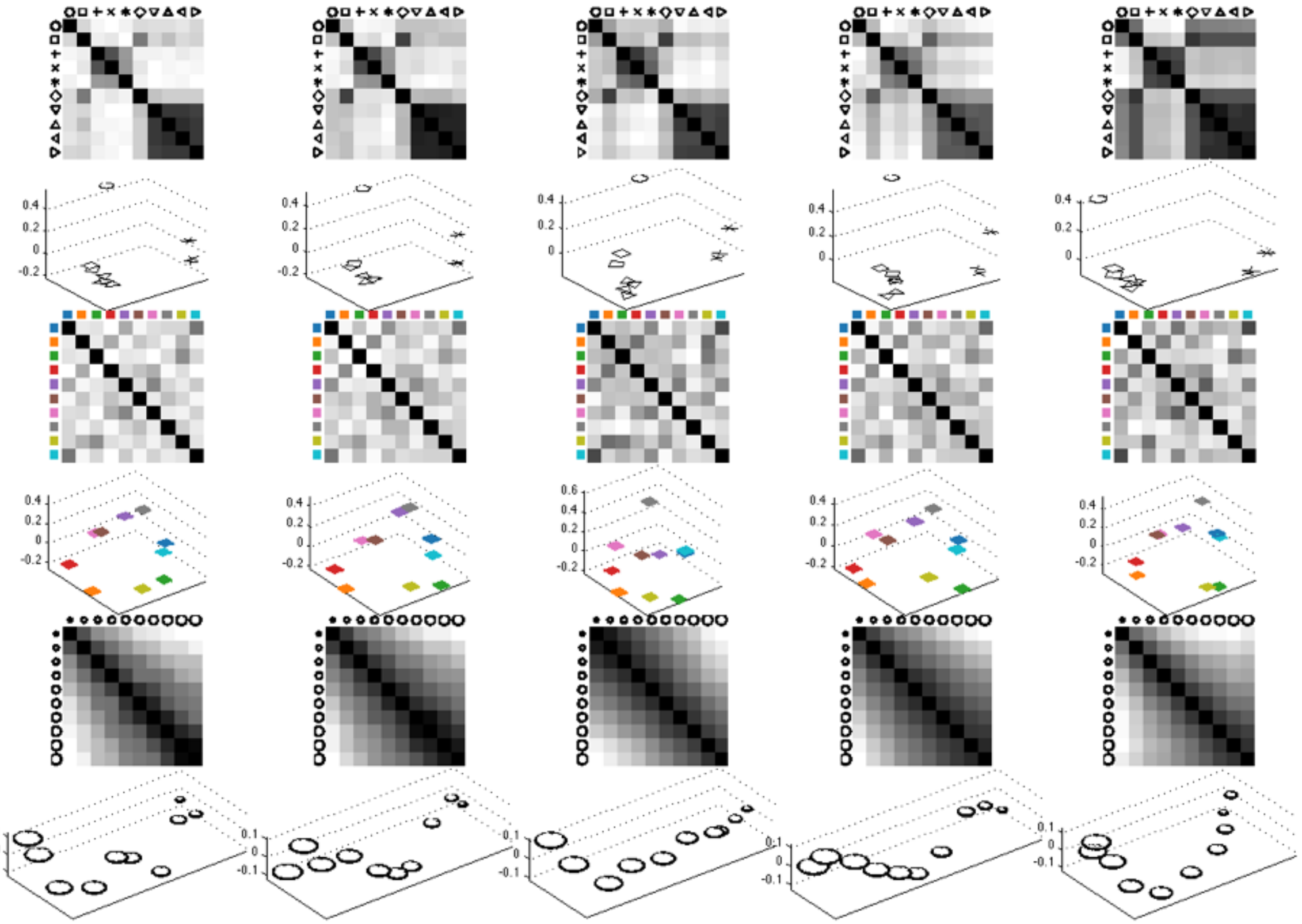
Univariate Perceptual Kernels with MDS Projections*



*For each visual variable, projections are aligned to the projection of the L5 kernel

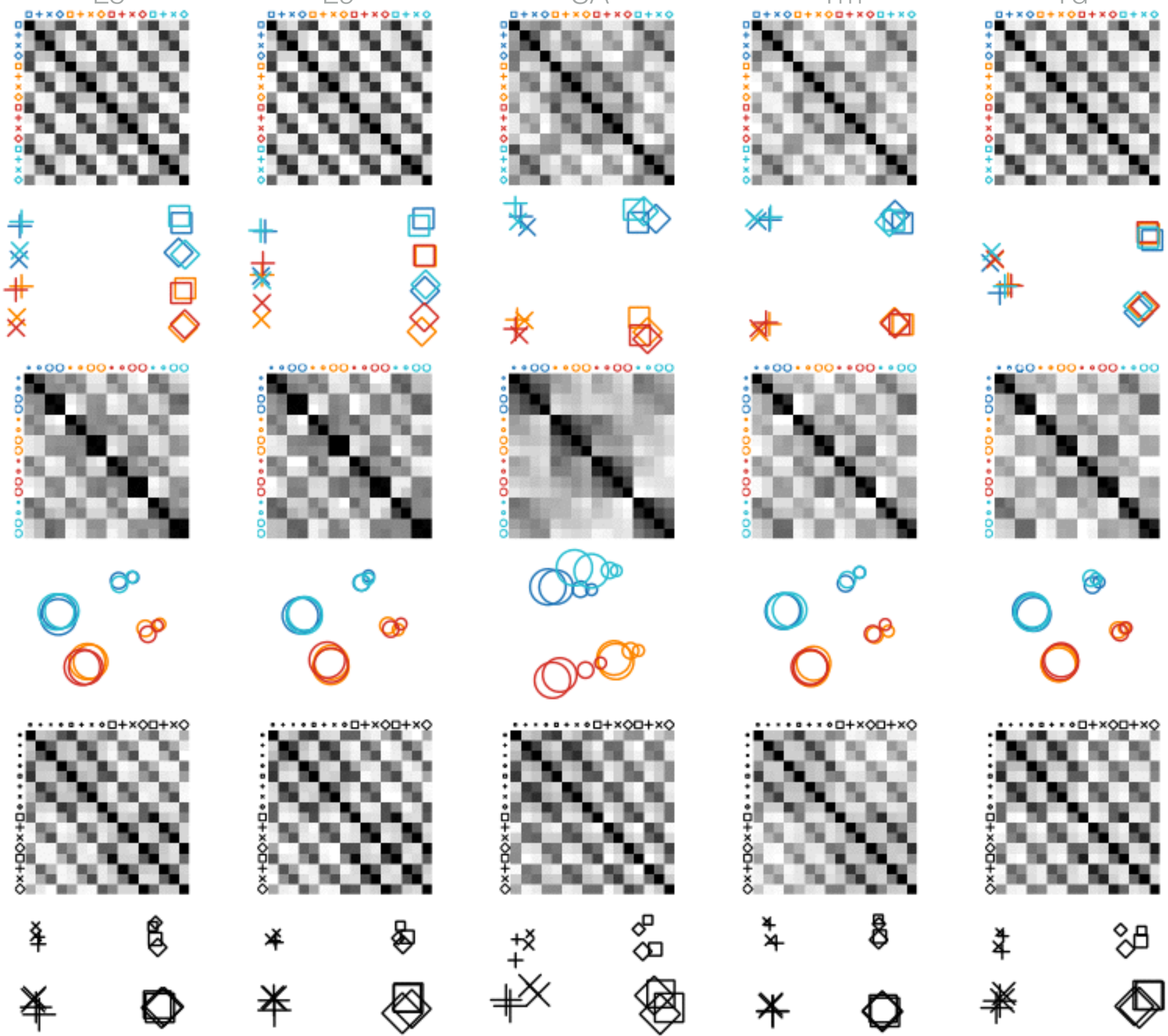
Univariate Perceptual Kernels with 3D MDS Projections

L5 L9 SA Tm Td



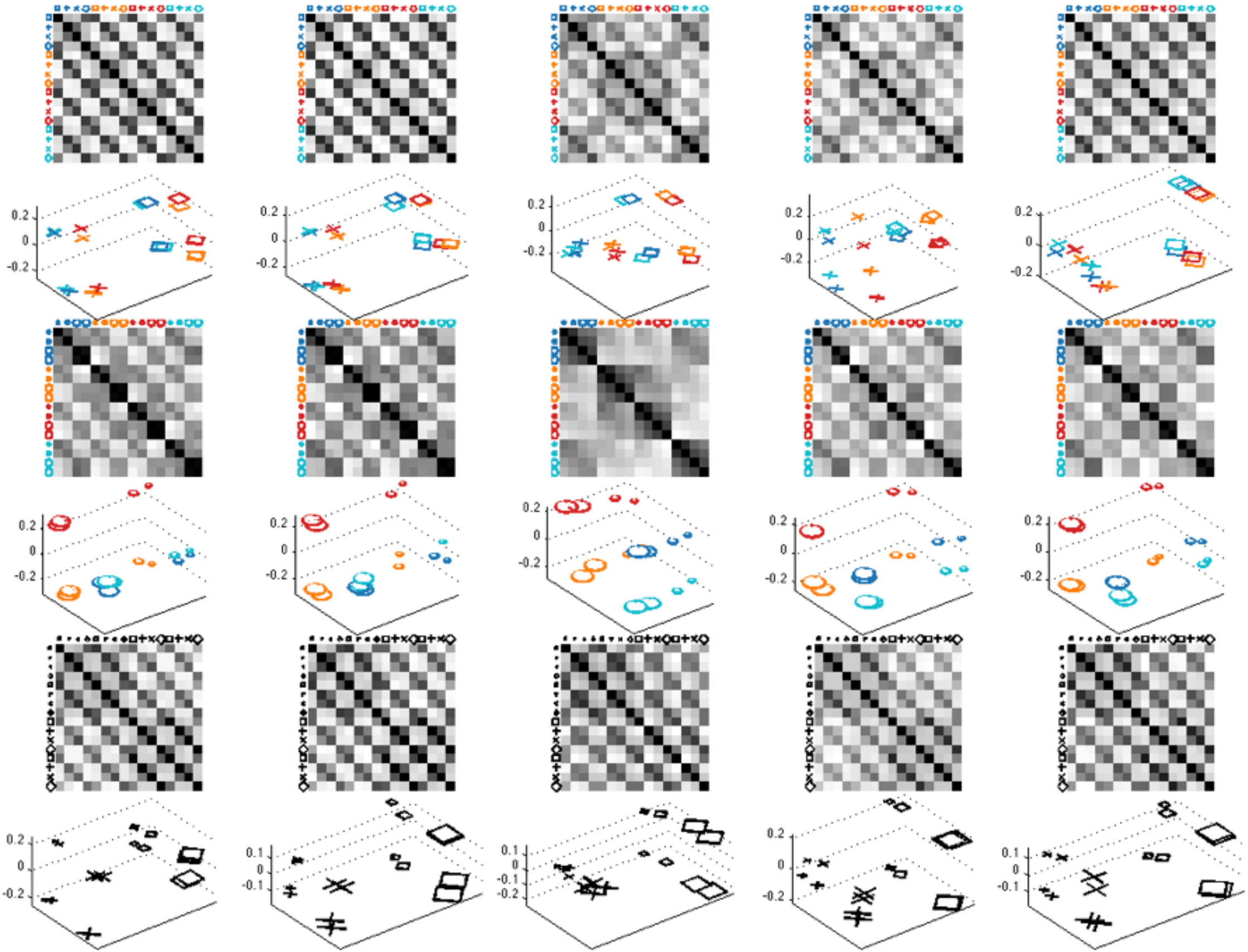
Bivariate Perceptual Kernels with MDS Projections

L5 L9 SA Tm Td



Bivariate Perceptual Kernels with 3D MDS Projections

L5 L9 SA Tm Td



Significance of the Rank Correlations in Fig 9

	kernel (Tm)	CIELAB	CIEDE2000	Color Names
kernel (Tm)		0.002	0.002	0.002
CIELAB			0.002	0.002
CIEDE2000				0.002

All rank correlations reported in Fig 9 in the paper are significant at $p < 0.002$ with. We determine the p values using permutation testing (i.e., Mantel test).

Significance of the Rank Correlations in Table 3

shape

	L5	L9	SA	Tm	Td
L5		0.002	0.002	0.002	0.002
L9			0.002	0.002	0.002
SA				0.002	0.002
Tm					0.002

color

	L5	L9	SA	Tm	Td
L5		0.002	0.002	0.002	0.002
L9			0.002	0.002	0.002
SA				0.002	0.002
Tm					0.002

size

	L5	L9	SA	Tm	Td
L5		0.002	0.002	0.002	0.002
L9			0.002	0.002	0.002
SA				0.002	0.002
Tm					0.002

shape-color

	L5	L9	SA	Tm	Td
L5		0.002	0.002	0.002	0.002
L9			0.002	0.002	0.002
SA				0.002	0.002
Tm					0.002

shape-size

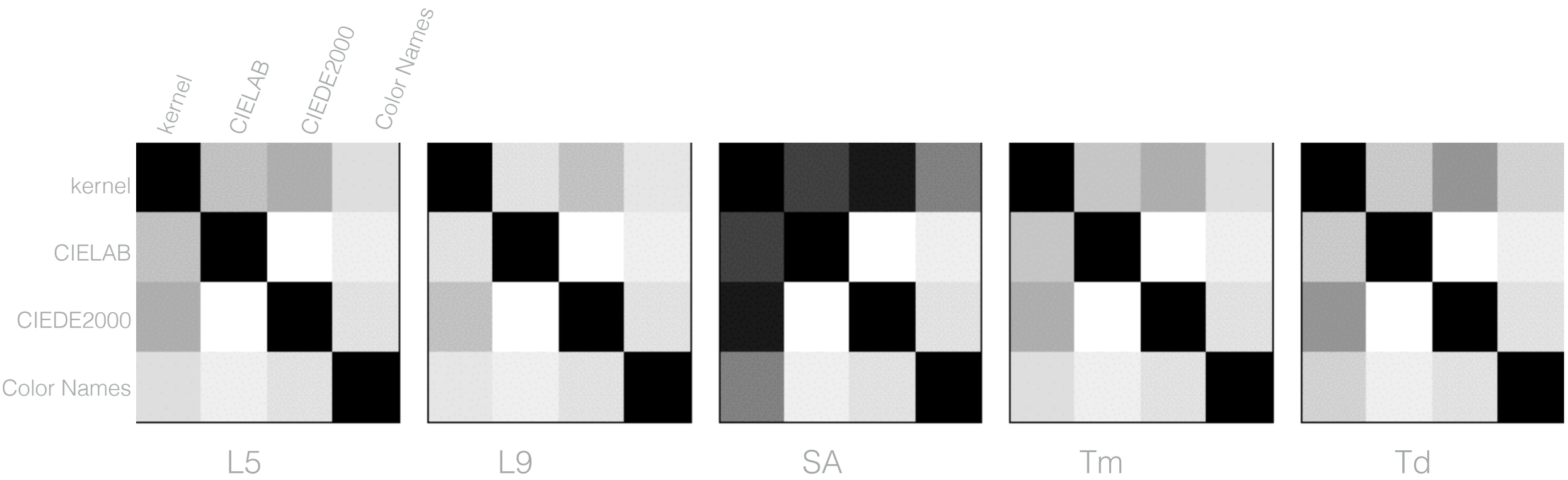
	L5	L9	SA	Tm	Td
L5		0.002	0.002	0.002	0.002
L9			0.002	0.002	0.002
SA				0.002	0.002
Tm					0.002

size-color

	L5	L9	SA	Tm	Td
L5		0.002	0.002	0.002	0.002
L9			0.002	0.002	0.002
SA				0.002	0.002
Tm					0.002

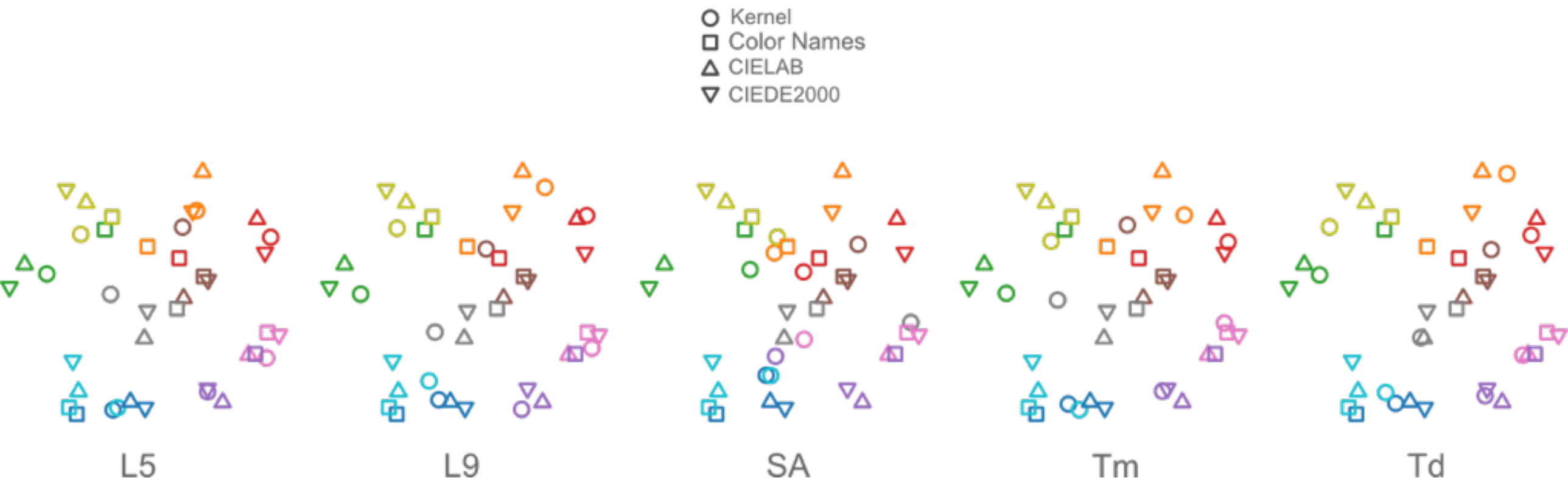
All rank correlations reported in Table 3 of the paper are significant at $p < 0.002$. We determine the p values using permutation testing.

Comparison of Perceptual Kernels with Color Models



Rank correlation matrices displayed as gray-scale images (brighter entries indicate higher correlations)

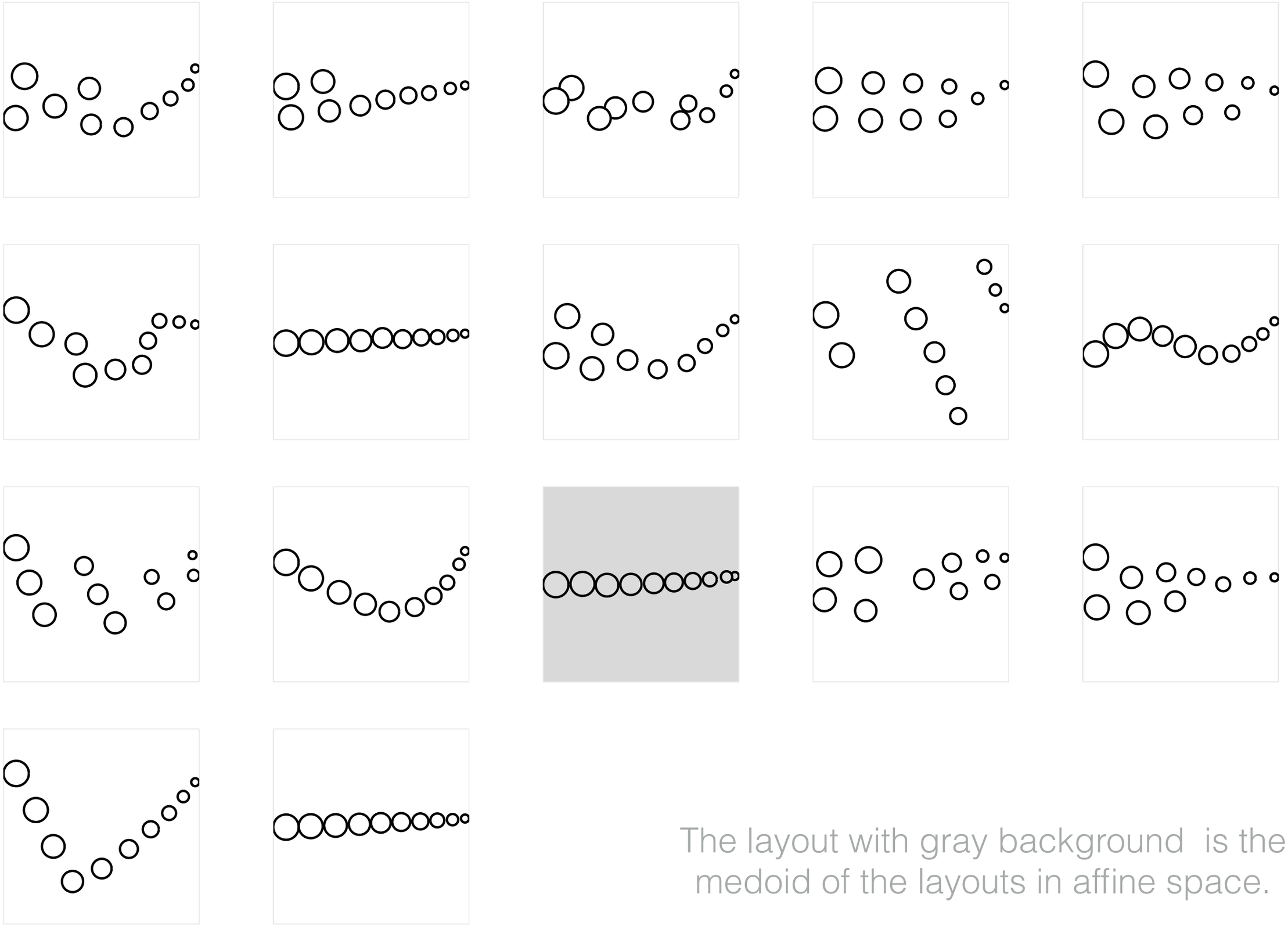
Comparison of Perceptual Color Kernels with Color Models



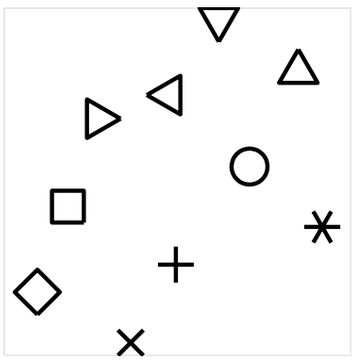
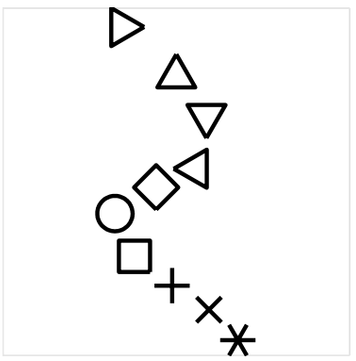
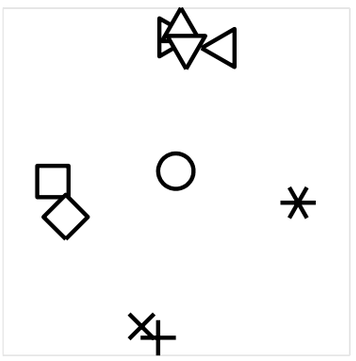
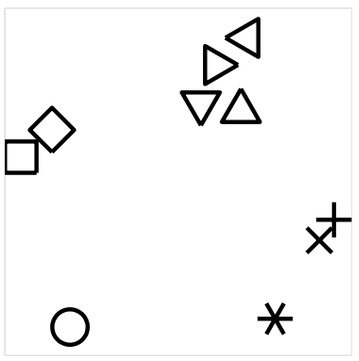
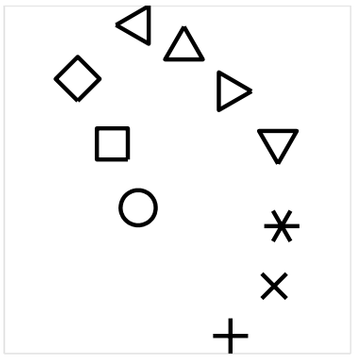
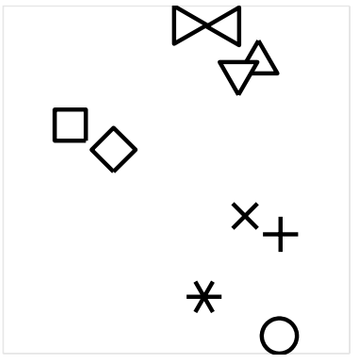
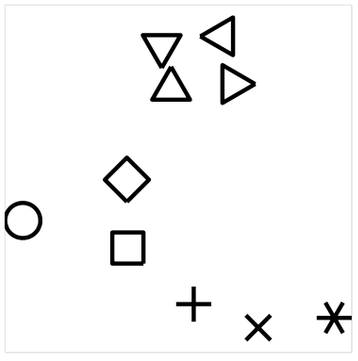
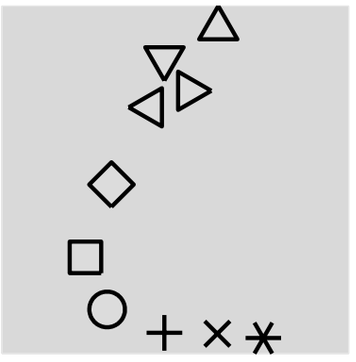
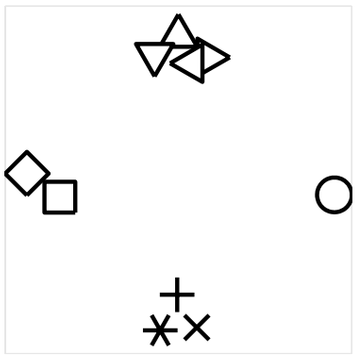
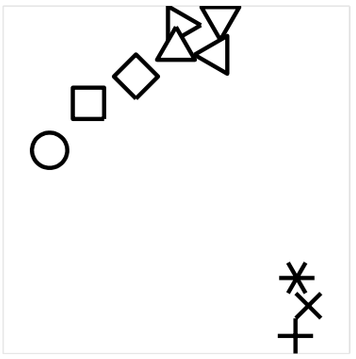
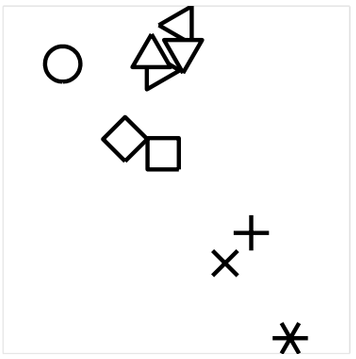
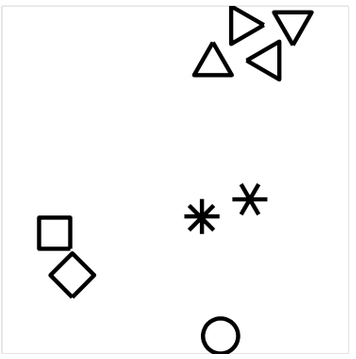
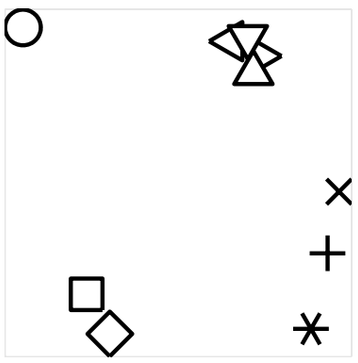
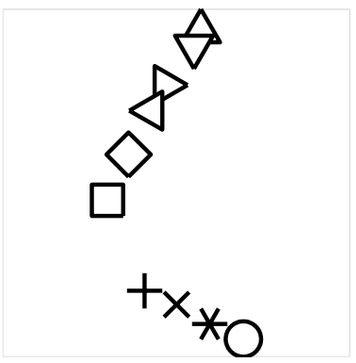
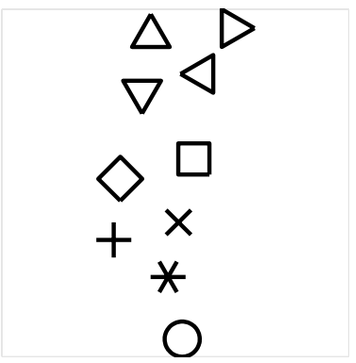
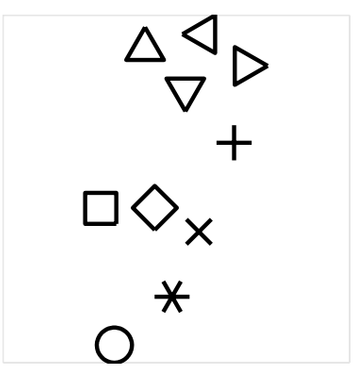
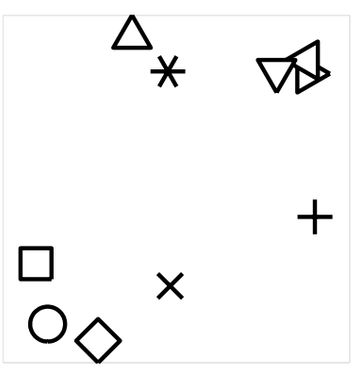
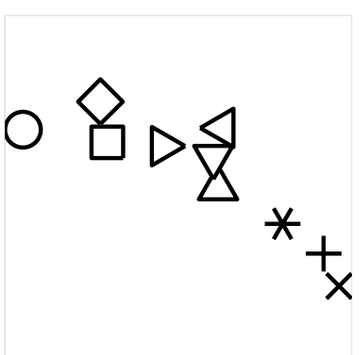
The palette shapes representing the models are chosen automatically with visual embedding (using the triplet matching kernel). They reflect the correlations between the variables. For example the correlation between the CIELAB and CIEDE2000 is higher than the correlation between the perceptual kernels and color names and the assigned shapes reflect this relationship perceptually.

All projections are aligned to the CIELAB projection in the plane using similarity transformations

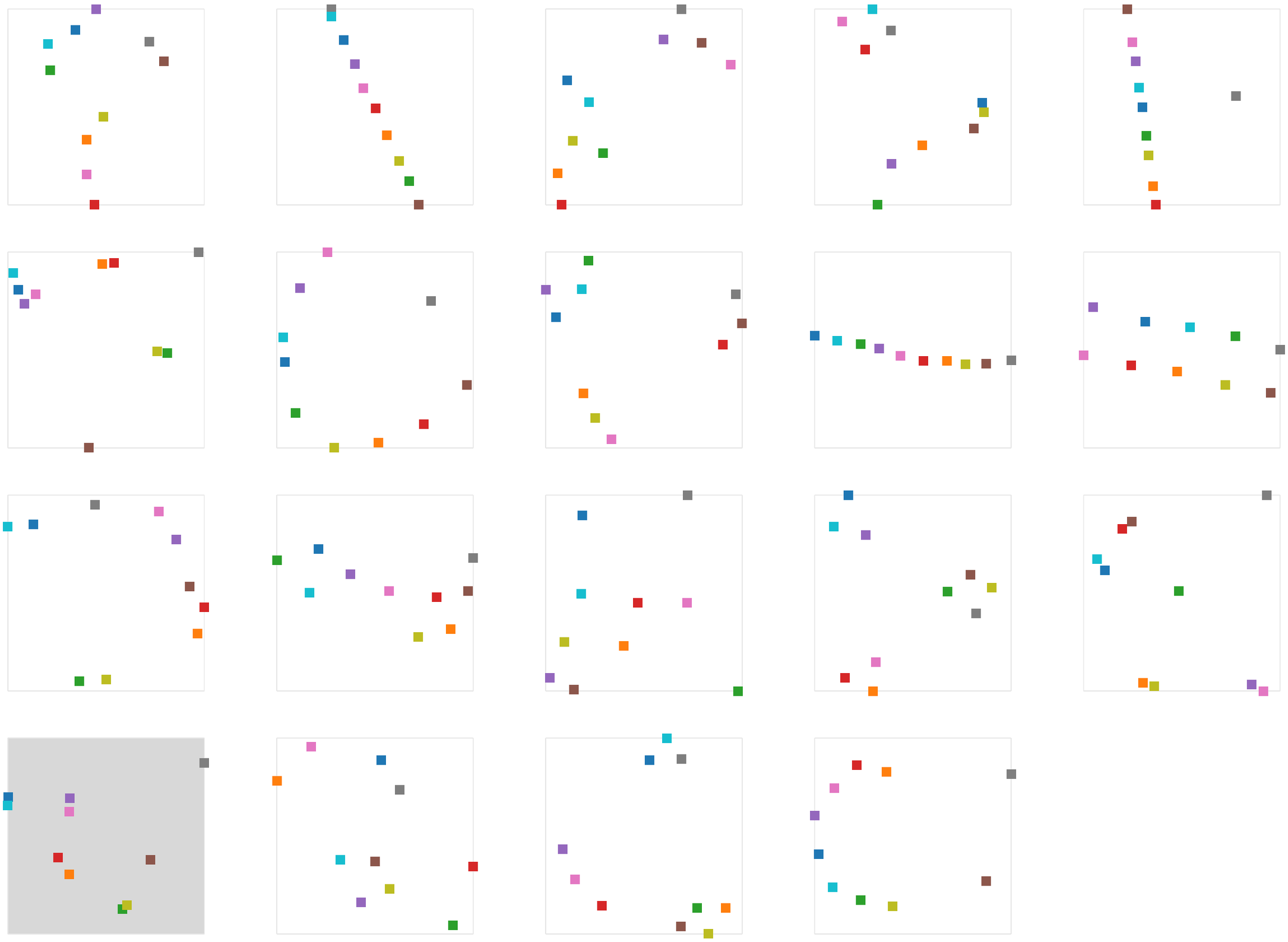
Per-subject Kernels: Size-SA



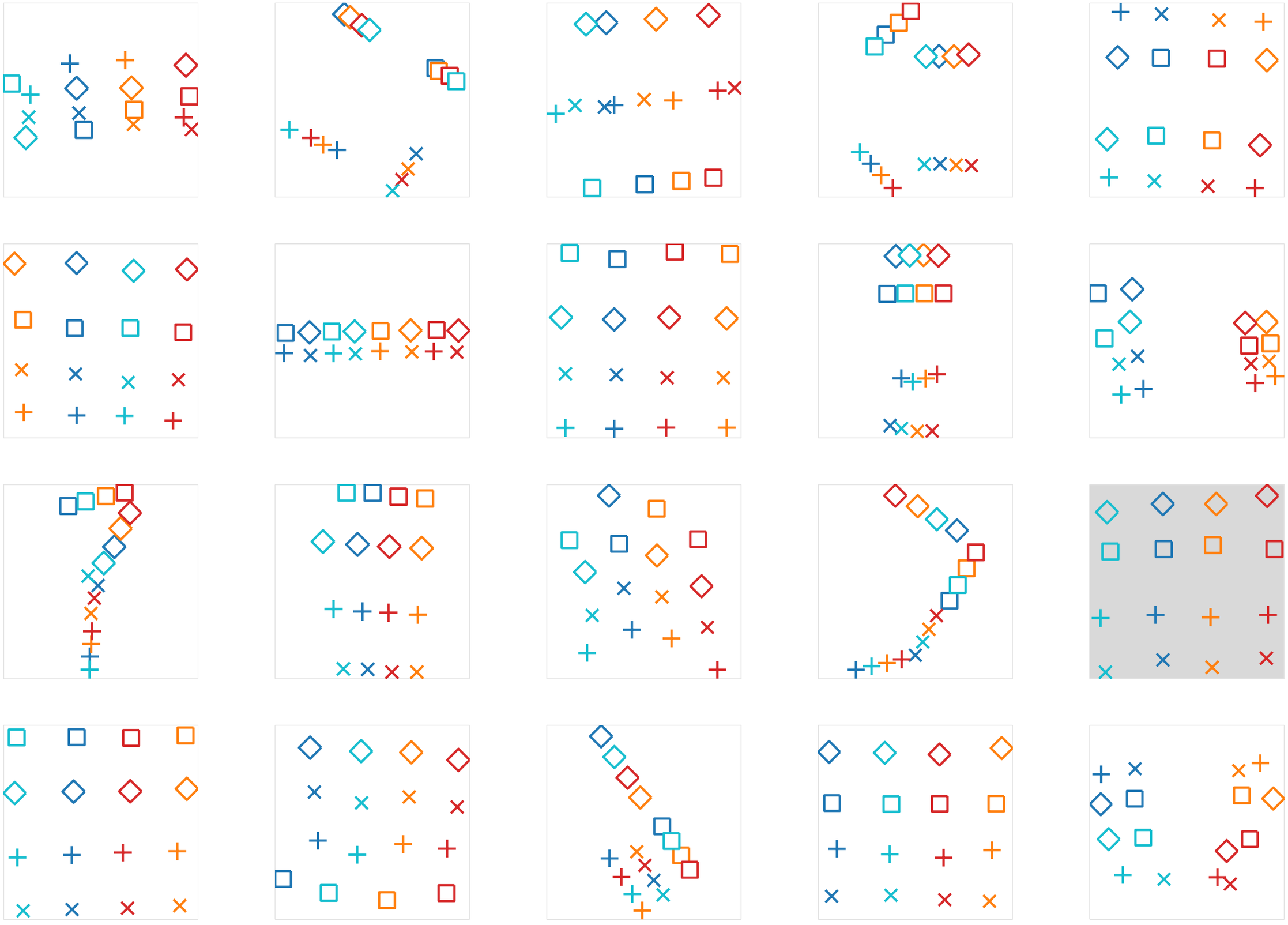
The layout with gray background is the medoid of the layouts in affine space.

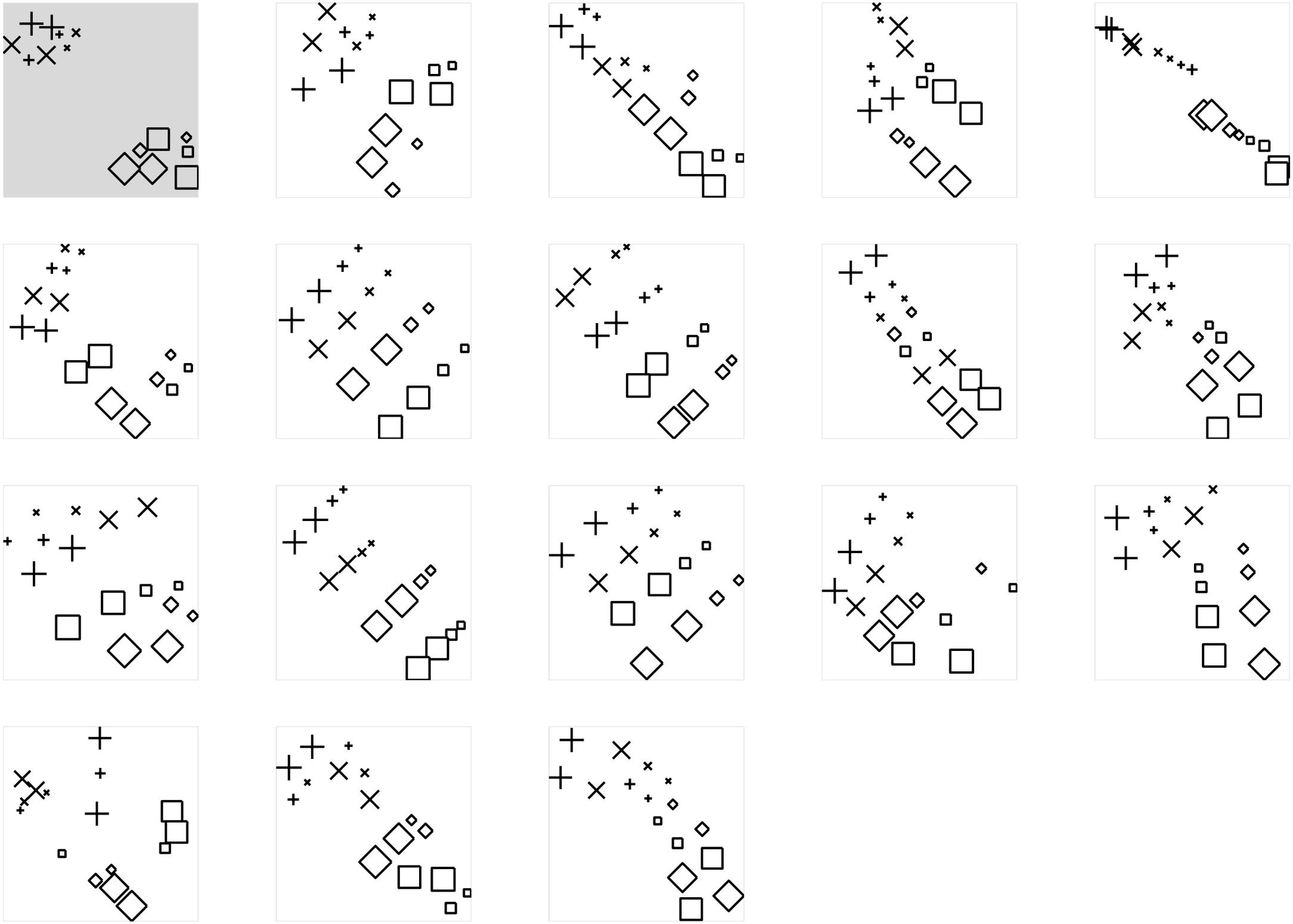
Per-subject Kernels: Color-SA



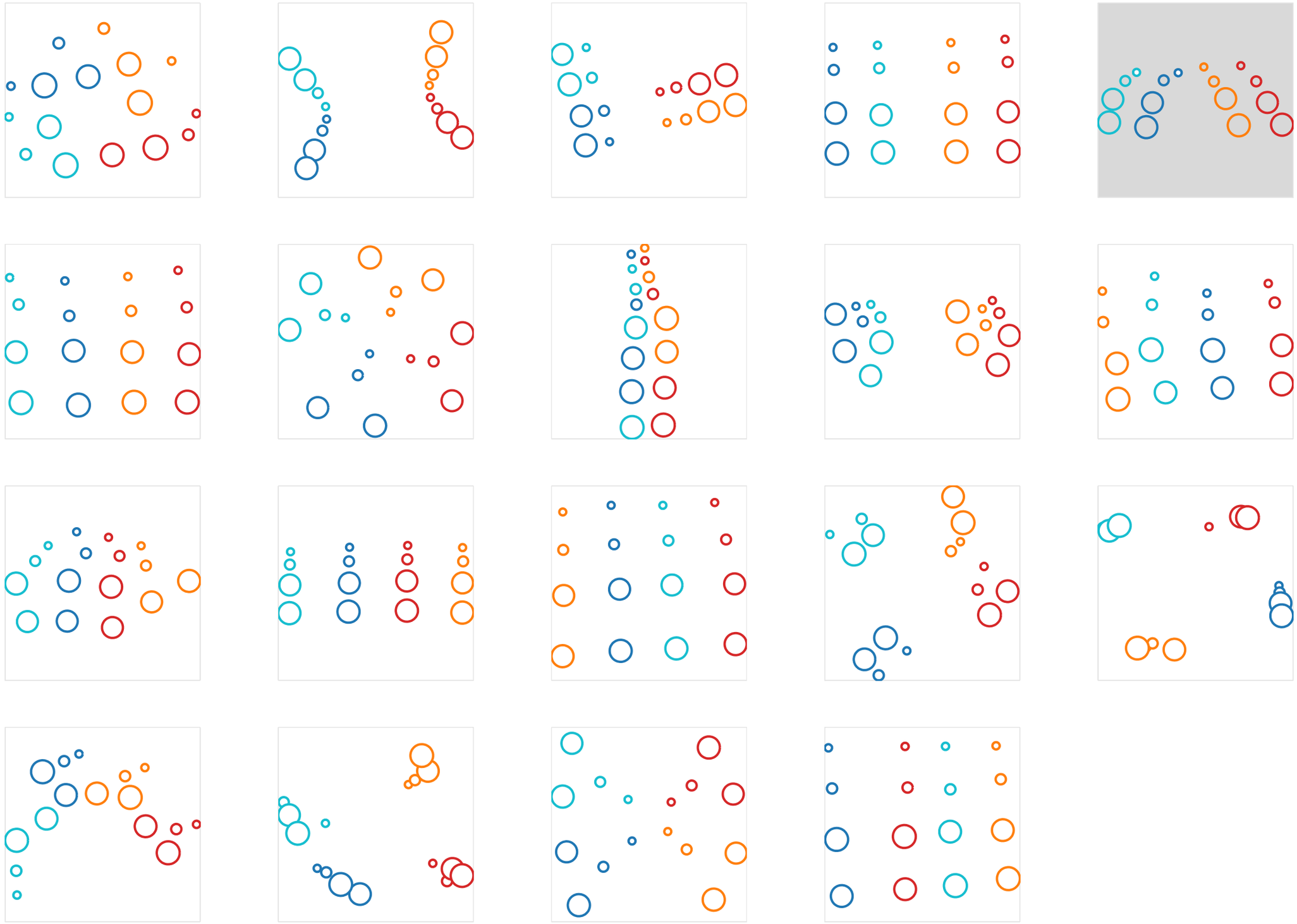
Per-subject Kernels: Shape-Color-SA



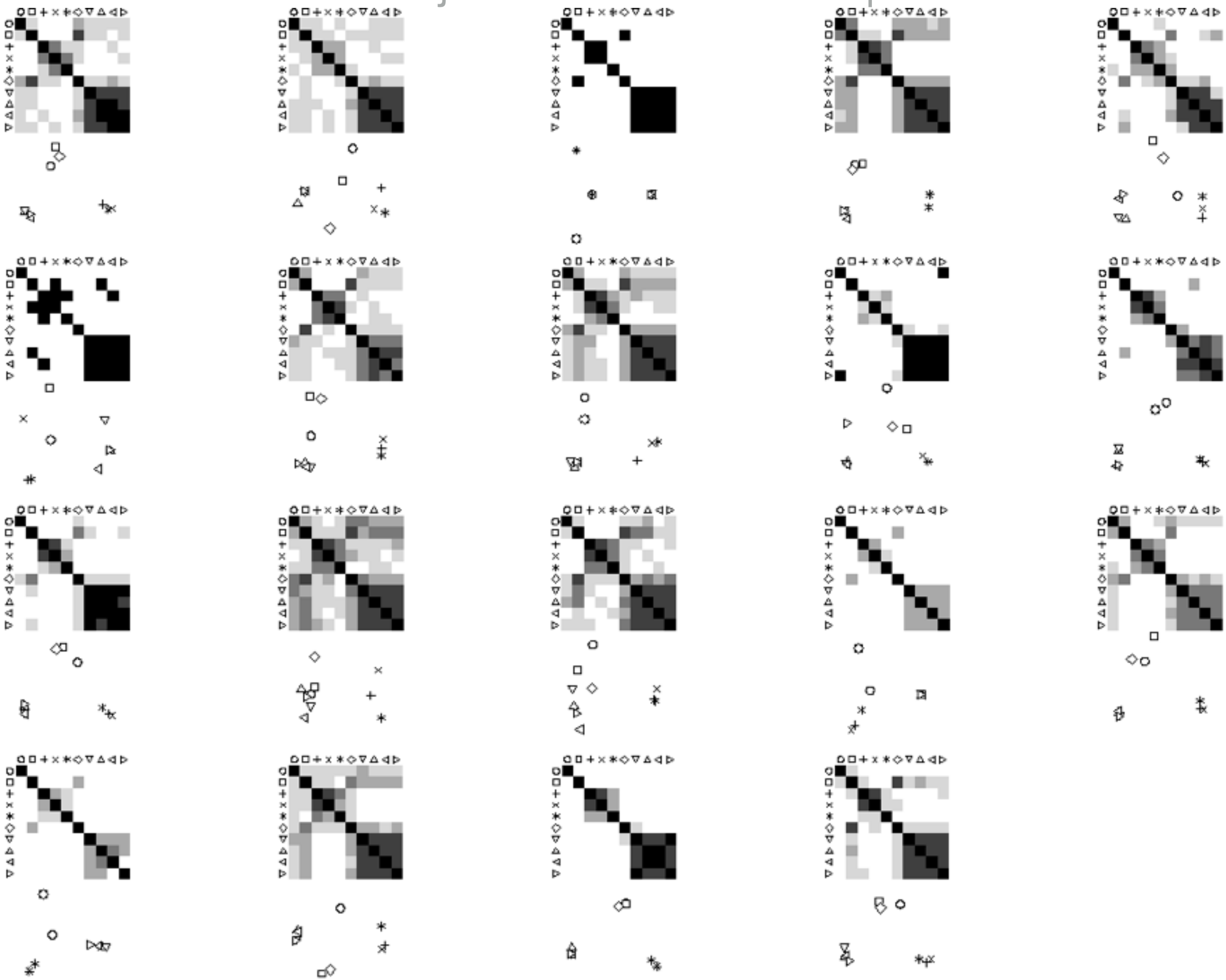
Per-subject Kernels: Shape-Size-SA



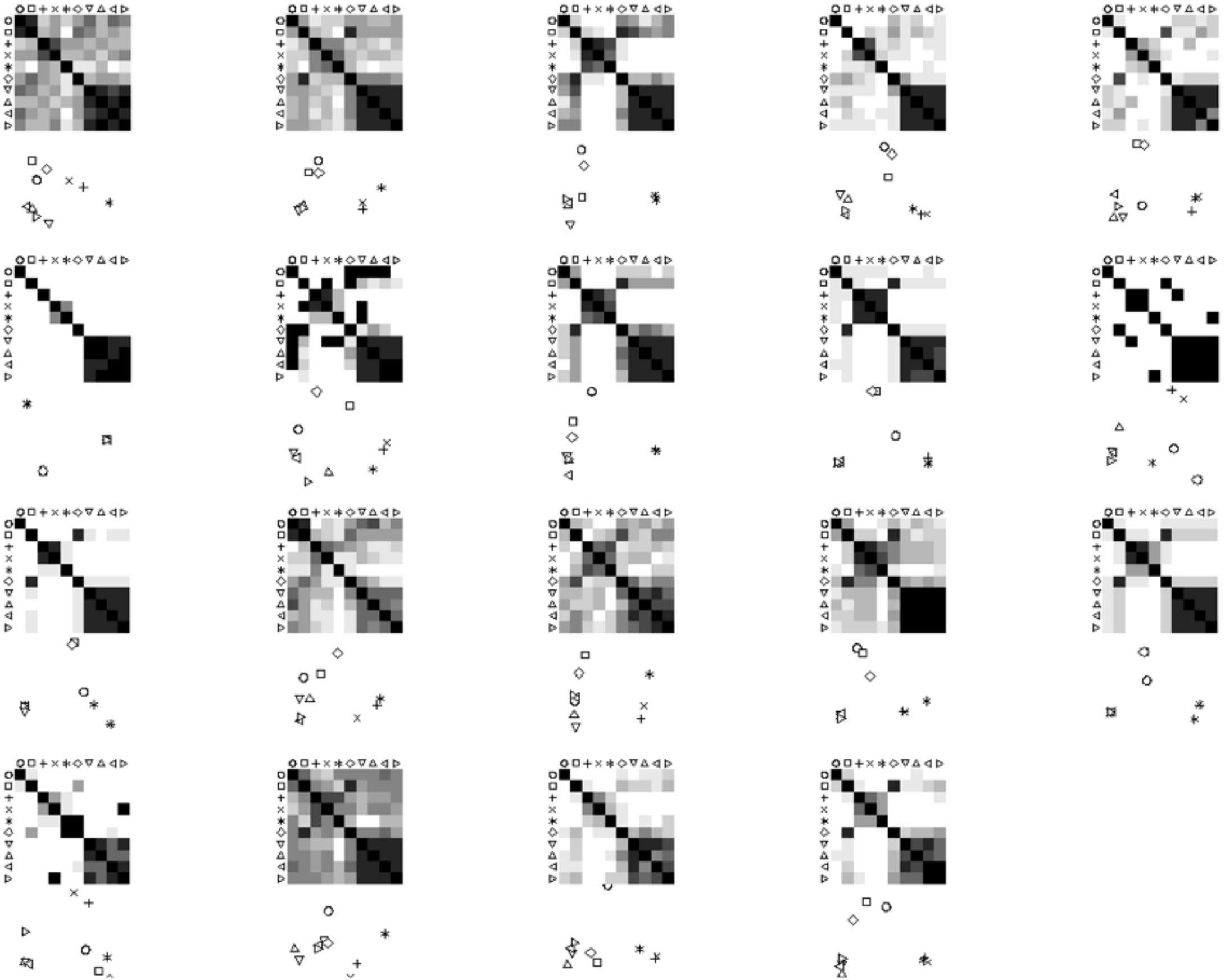
Per-subject Kernels: Size-Color-SA



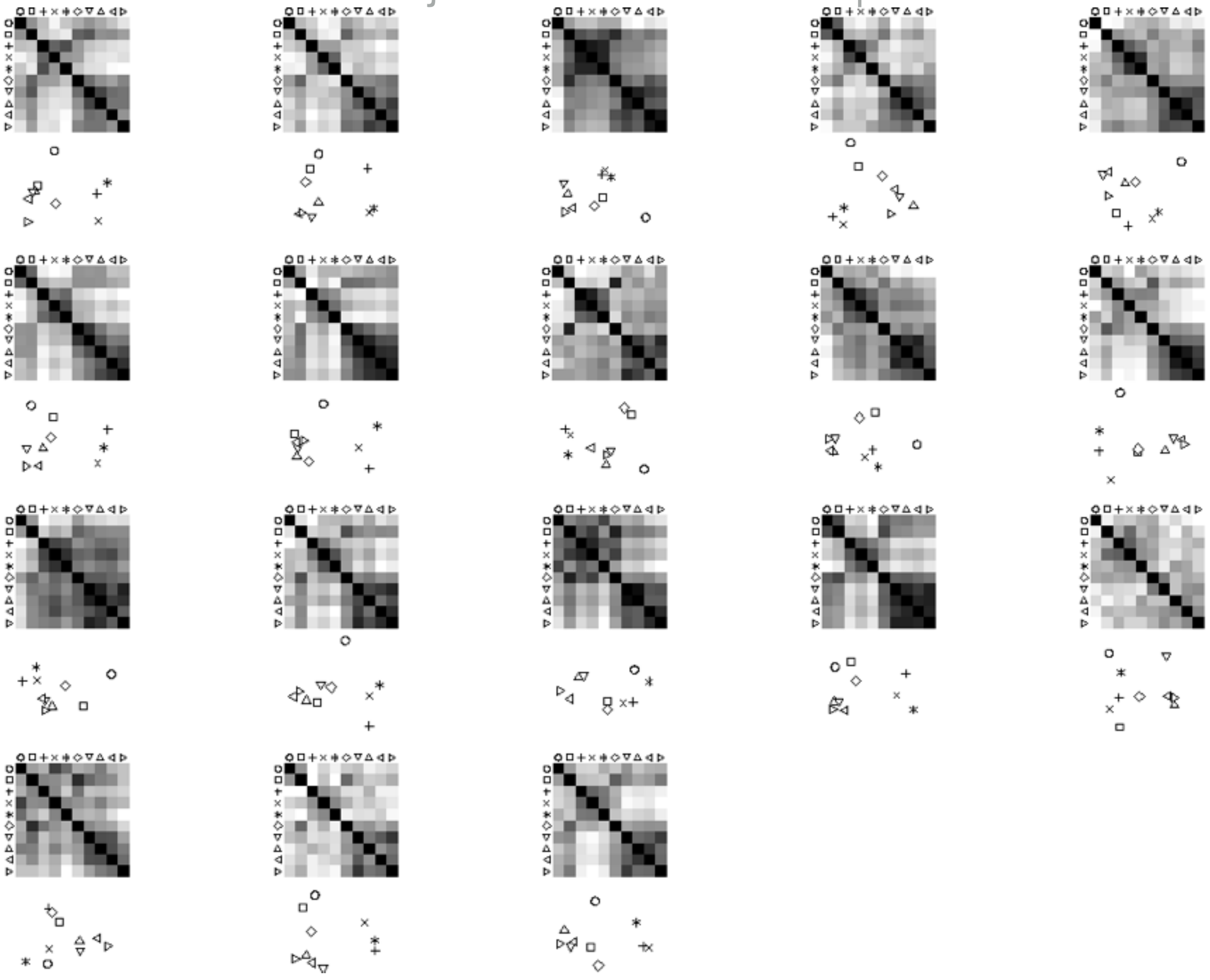
Per-subject Kernels: Shape-L5



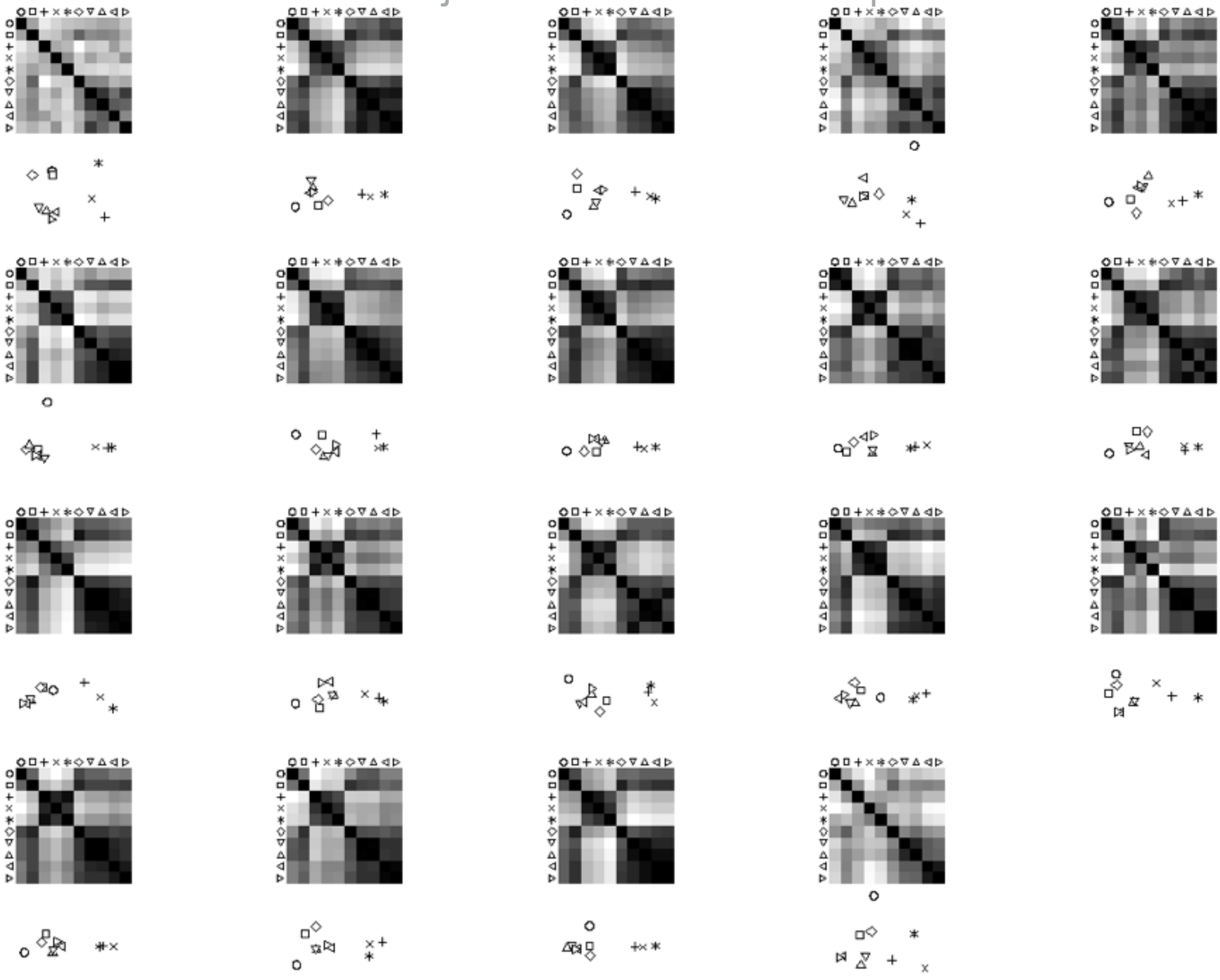
Per-subject Kernels: Shape-L9



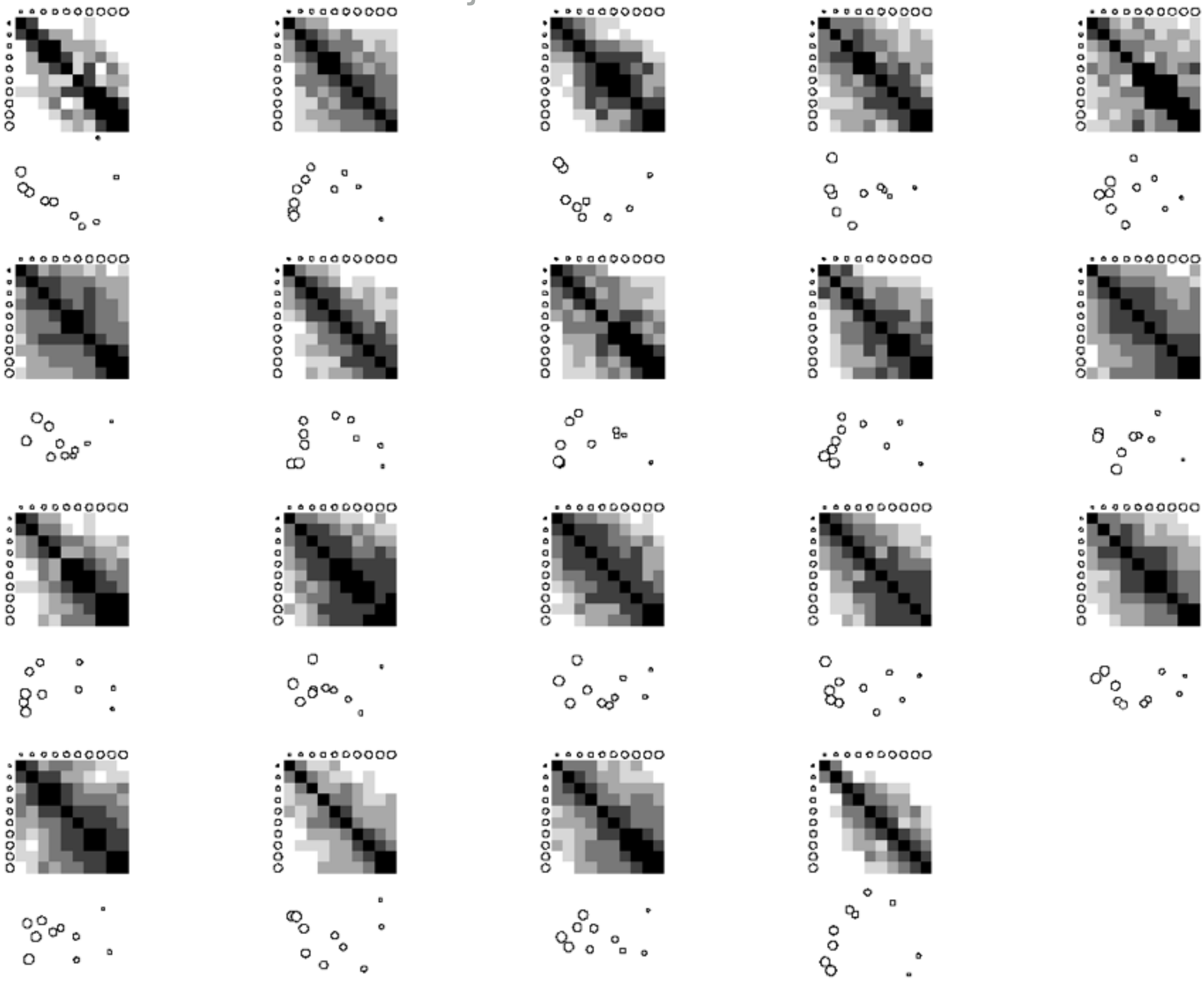
Per-subject Kernels: Shape-Tm



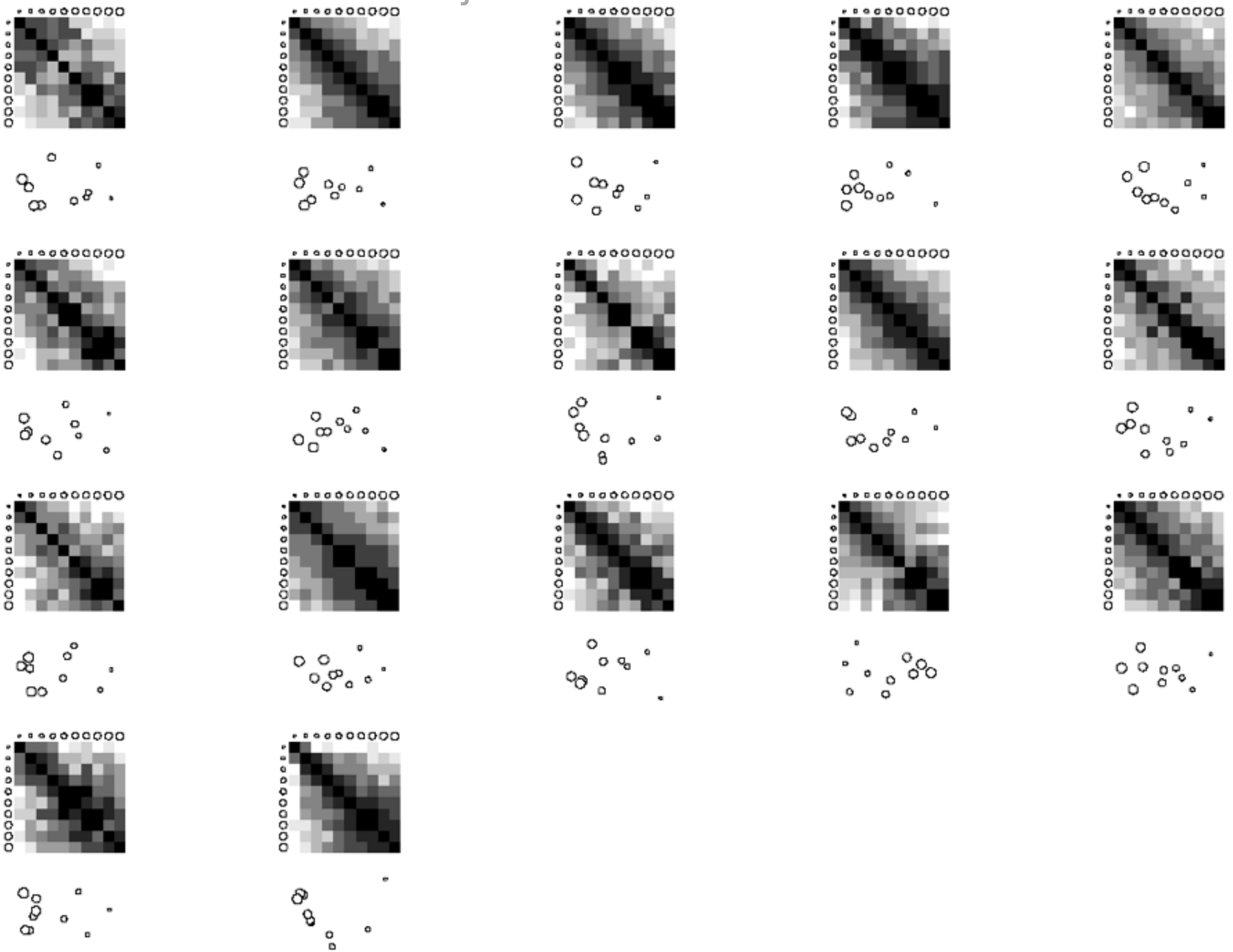
Per-subject Kernels: Shape-Td



Per-subject Kernels: Size-L5

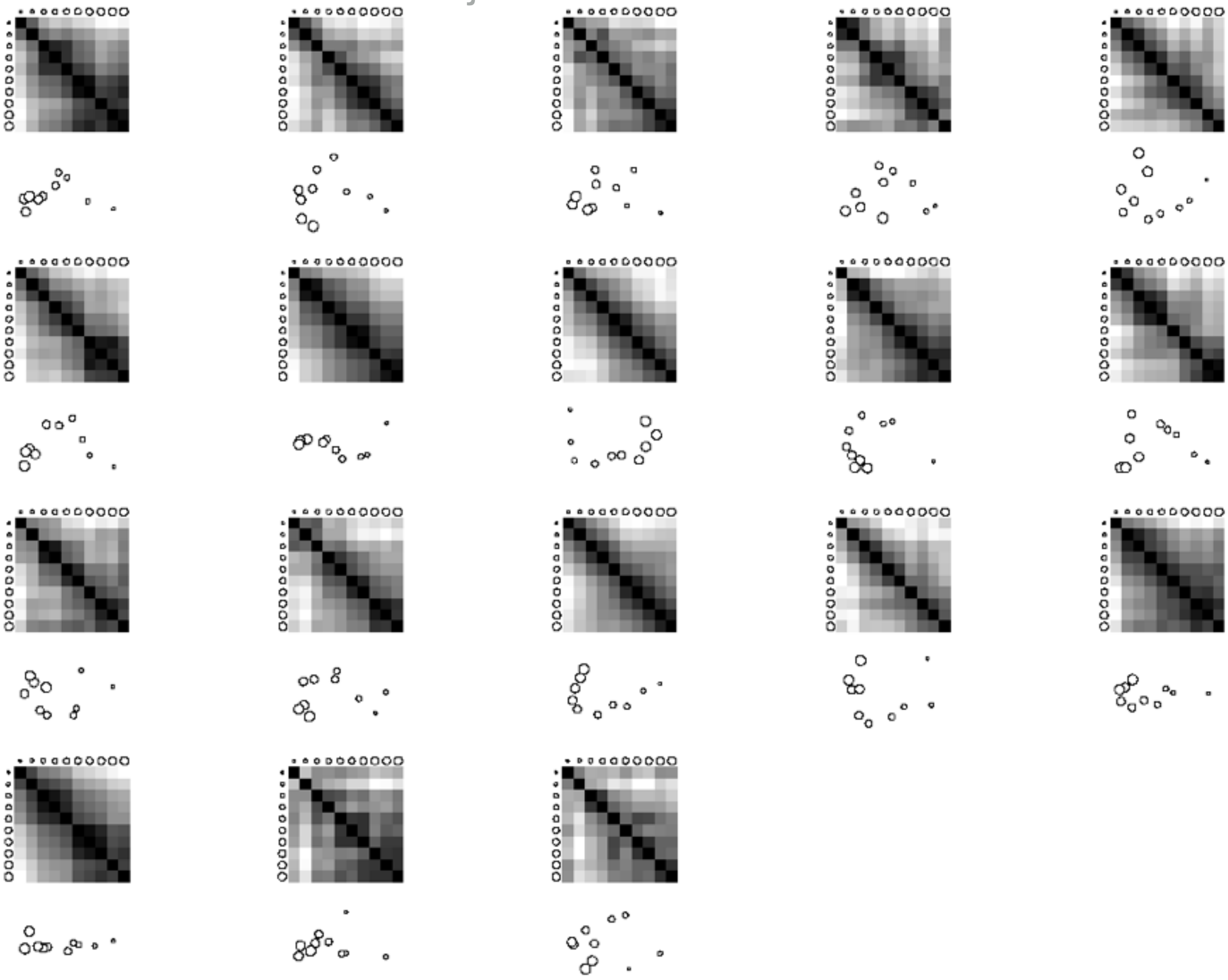


Per-subject Kernels: Size-L9

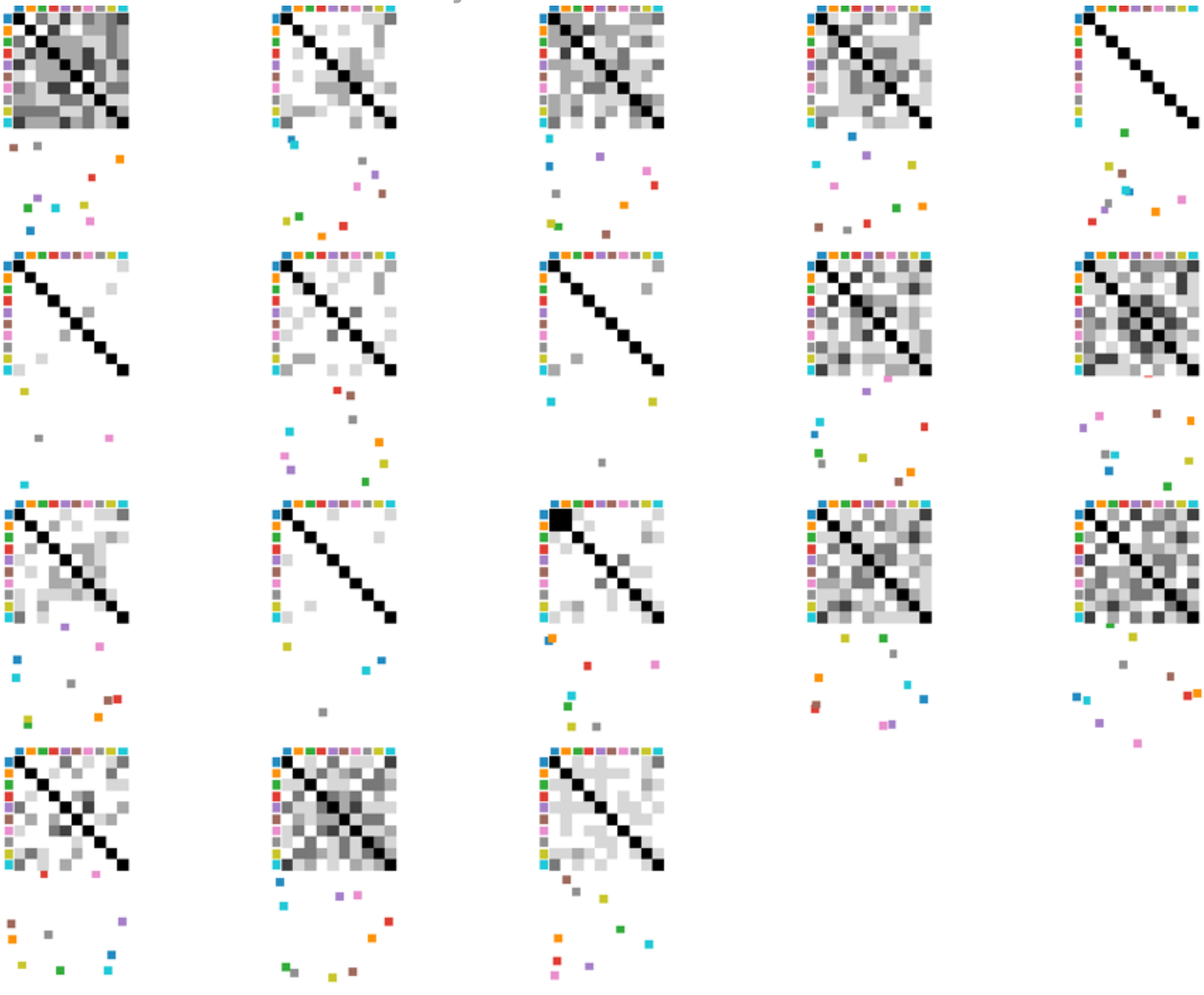


Per-subject Kernels: Size-Tm

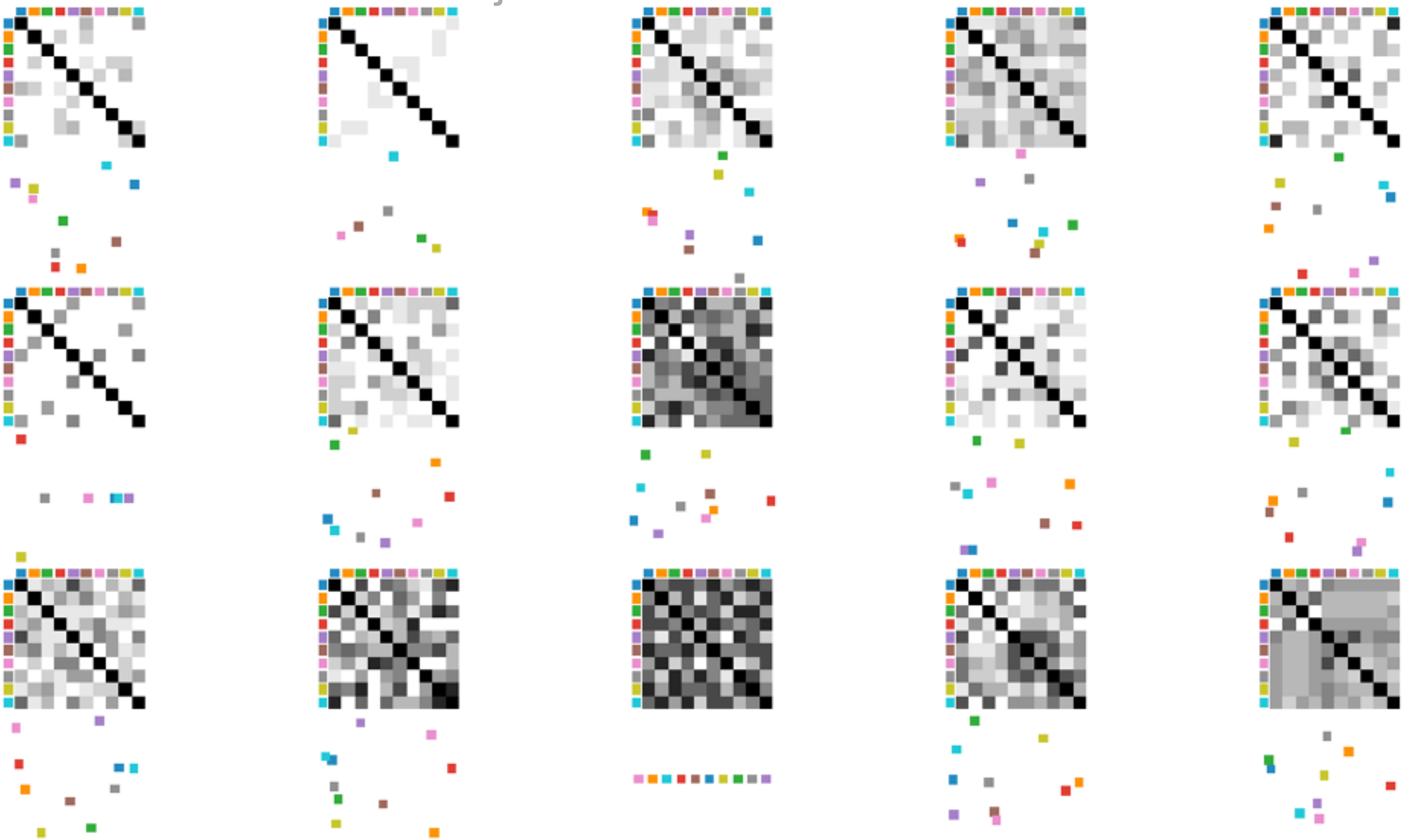
Per-subject Kernels: Size-Td



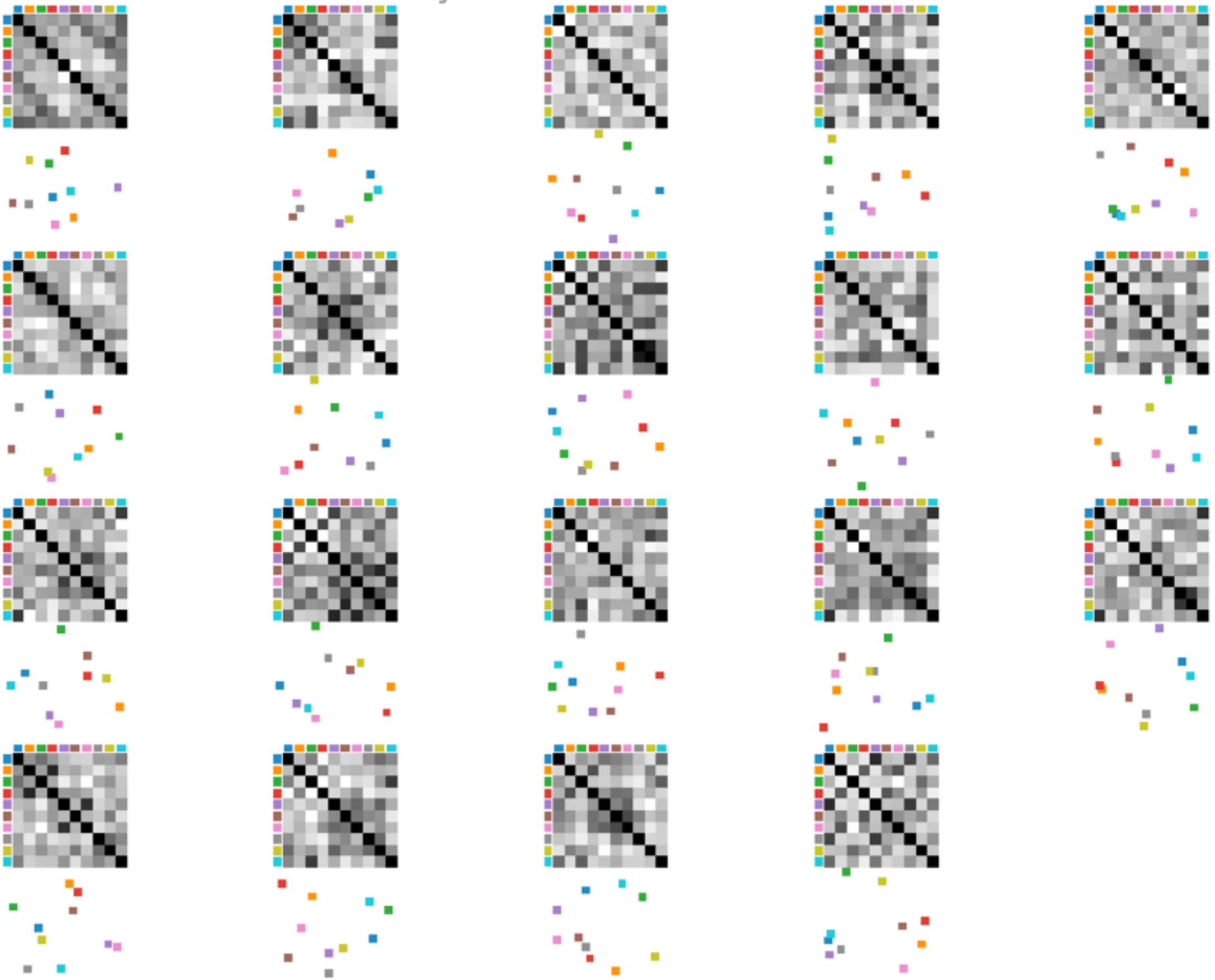
Per-subject Kernels: Color-L5



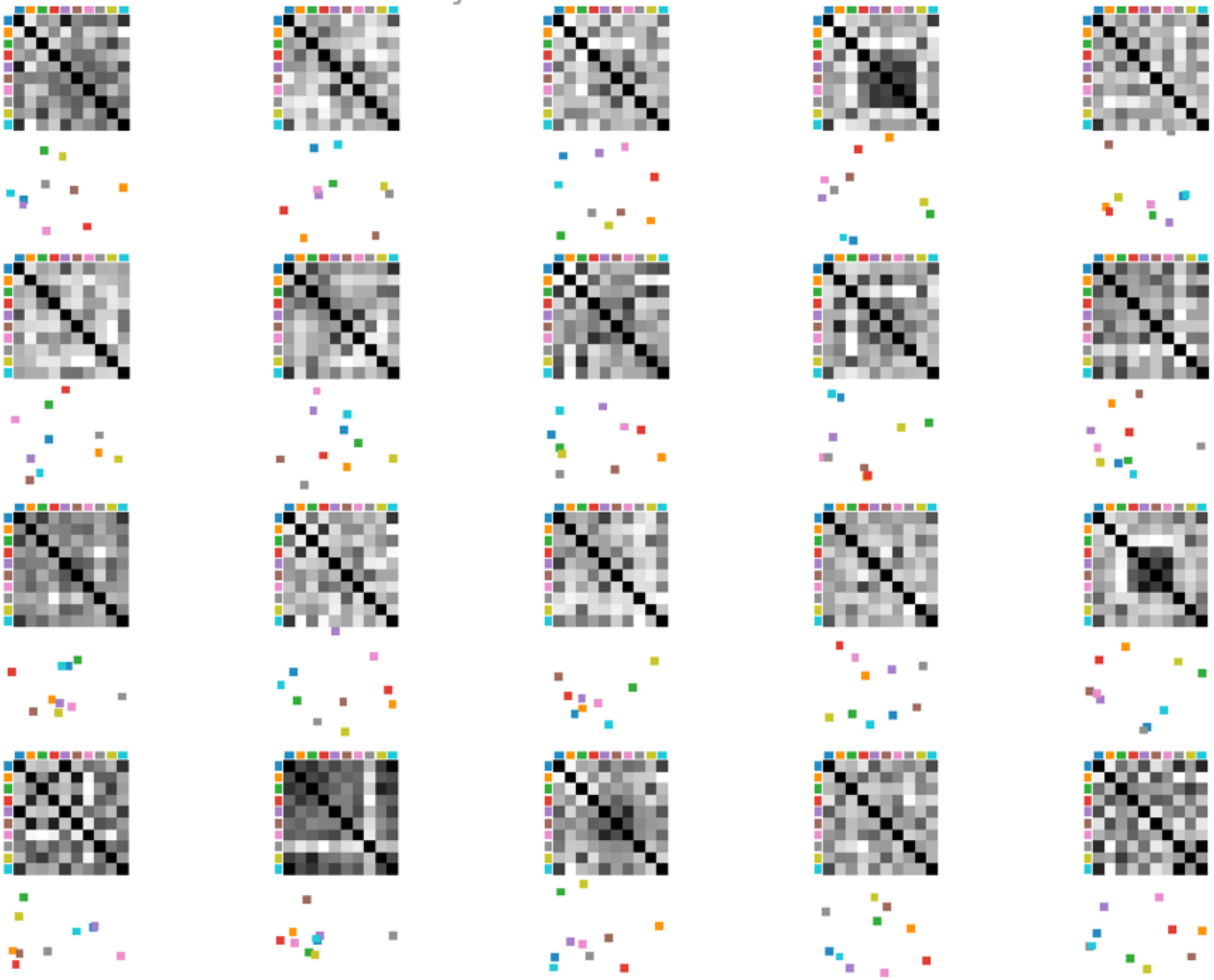
Per-subject Kernels: Color-L9



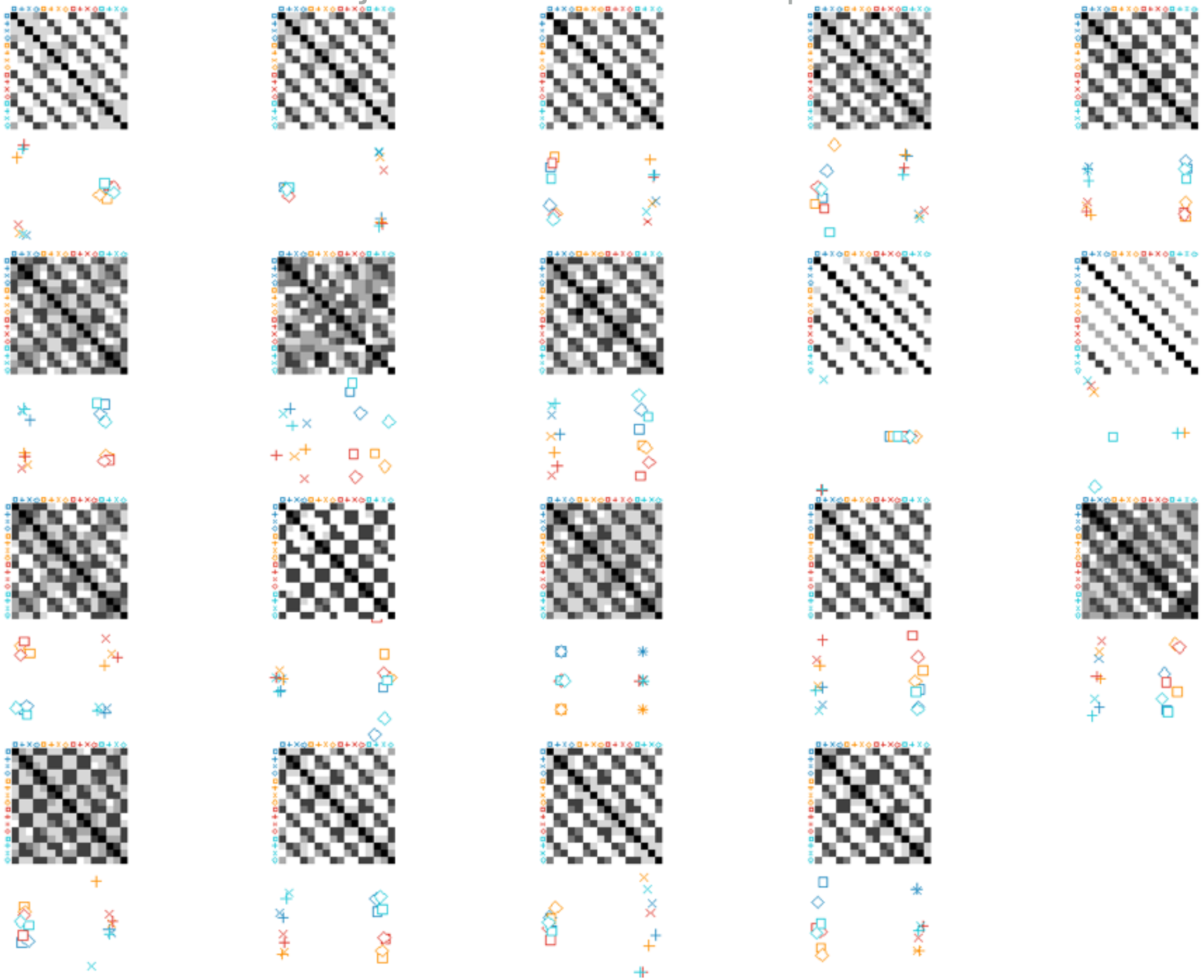
Per-subject Kernels: Color-Tm



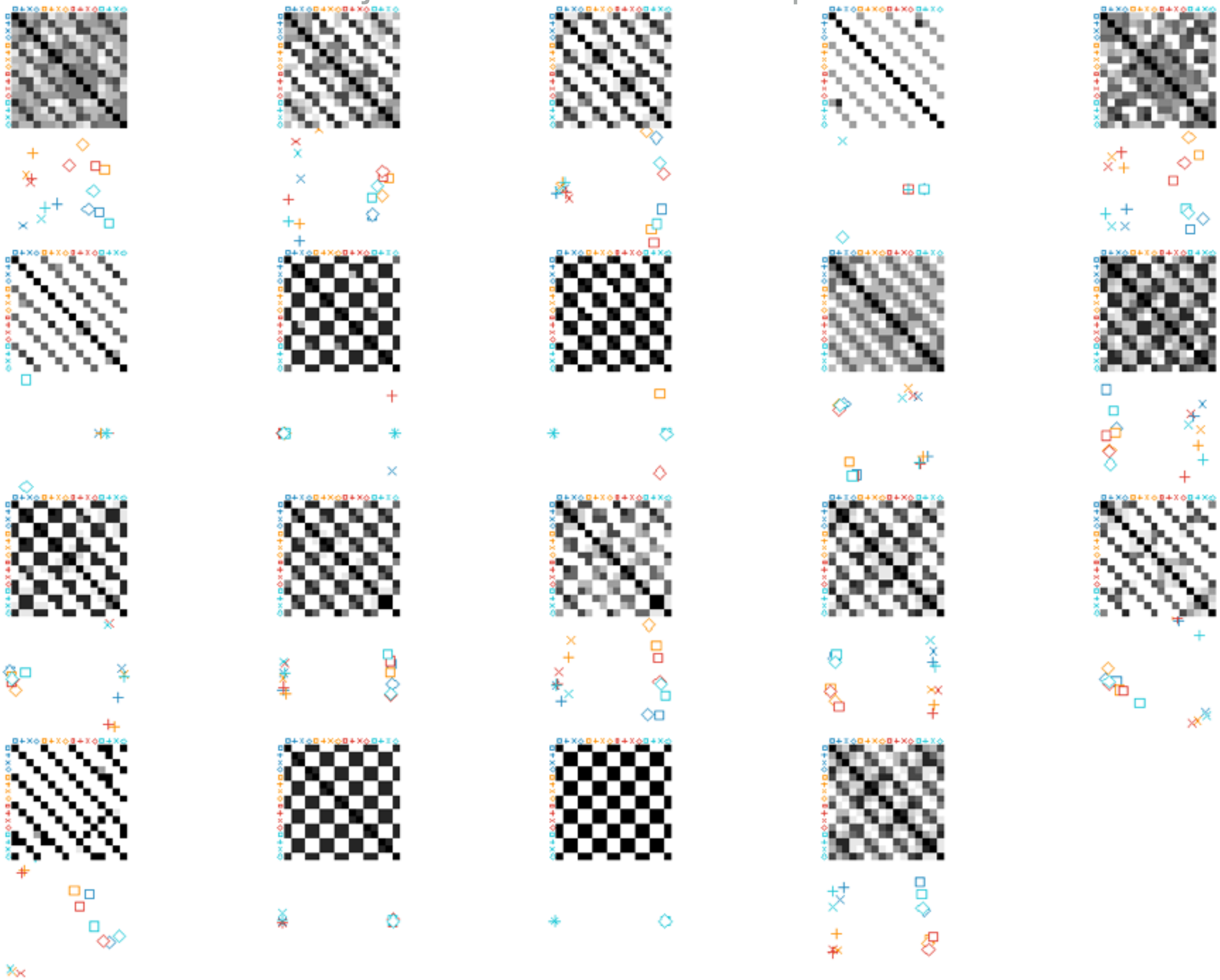
Per-subject Kernels: Color-Td



Per-subject Kernels: Shape-Color-L5

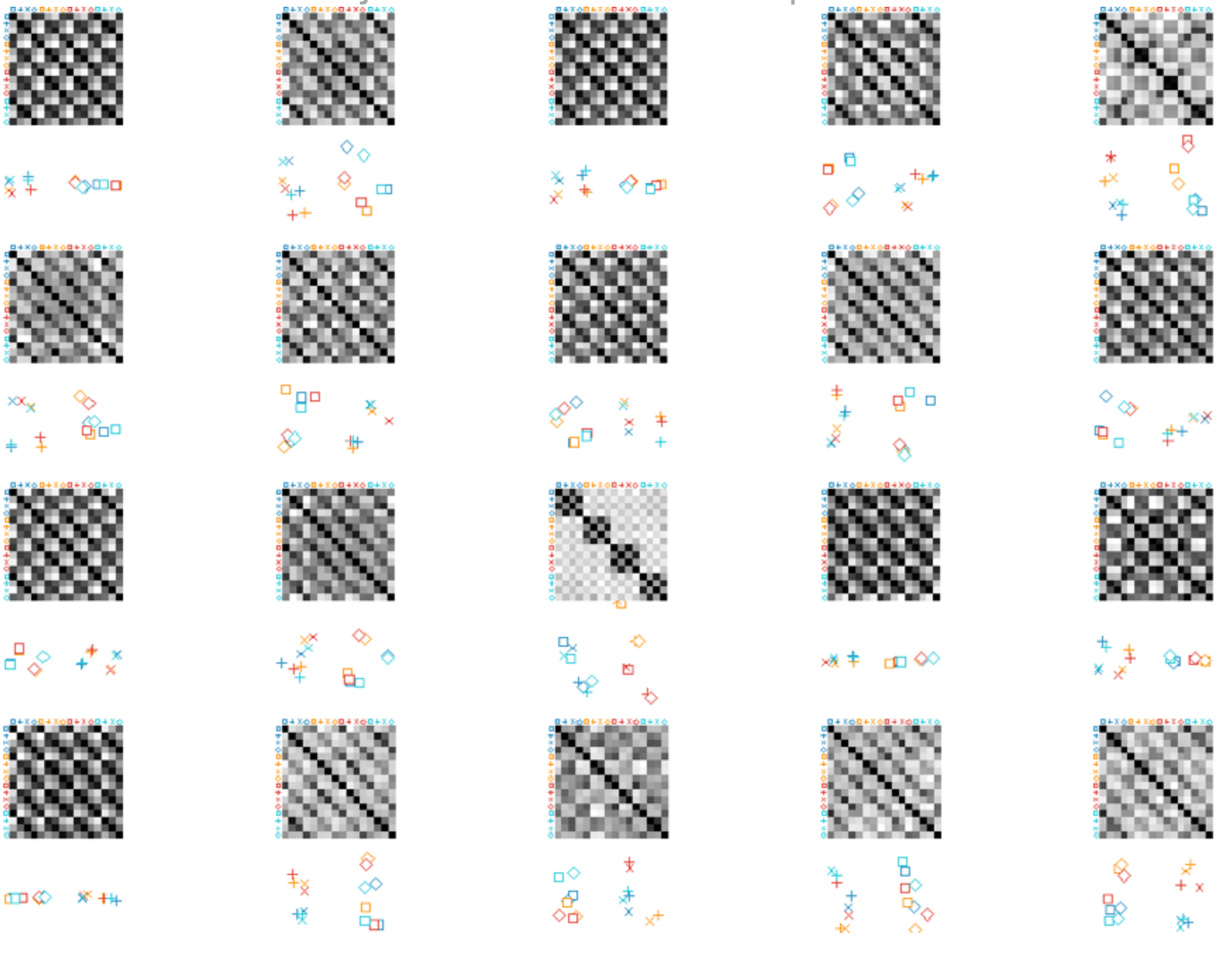


Per-subject Kernels: Shape-Color-L9

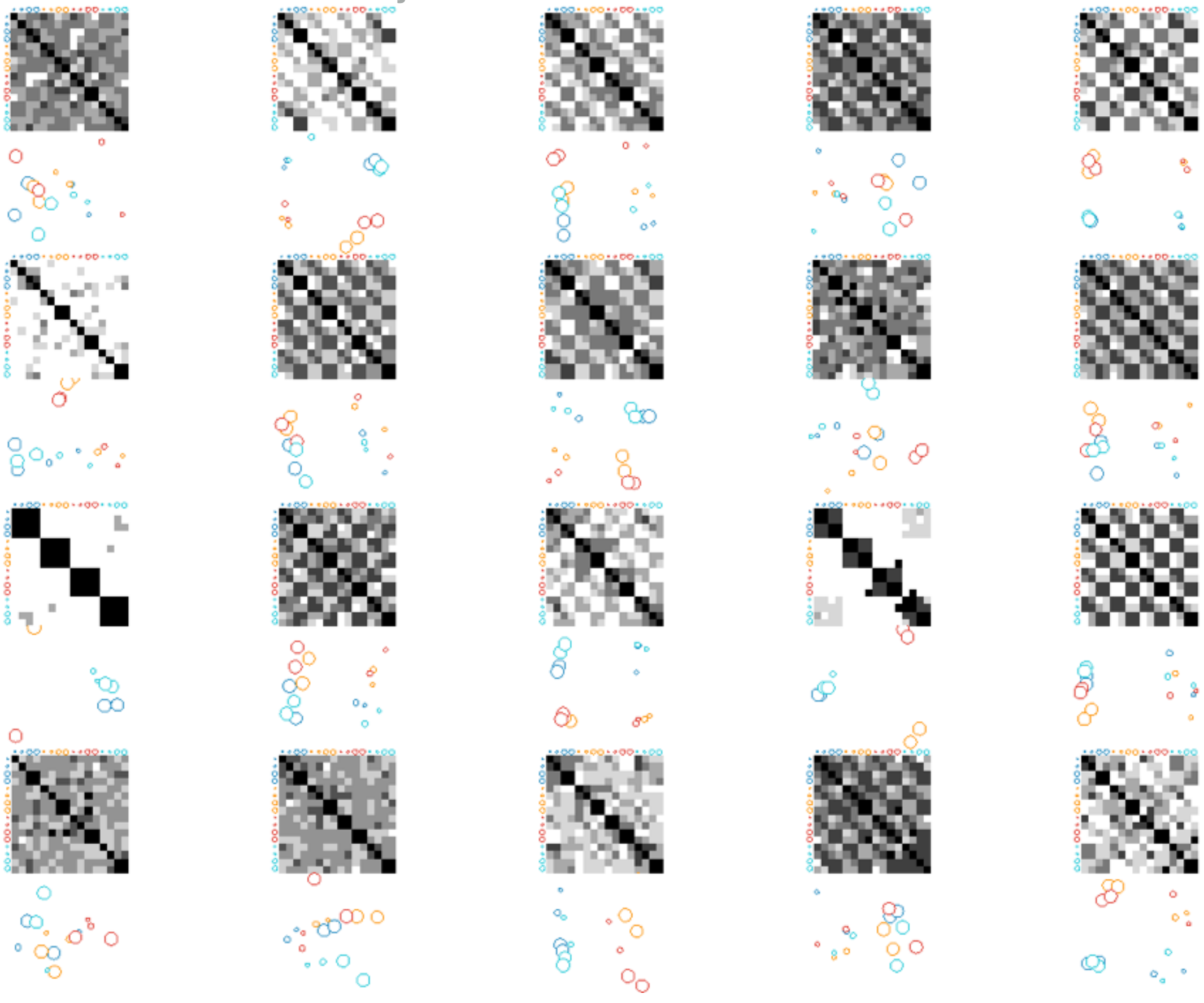


Per-subject Kernels: Shape-Color-Tm

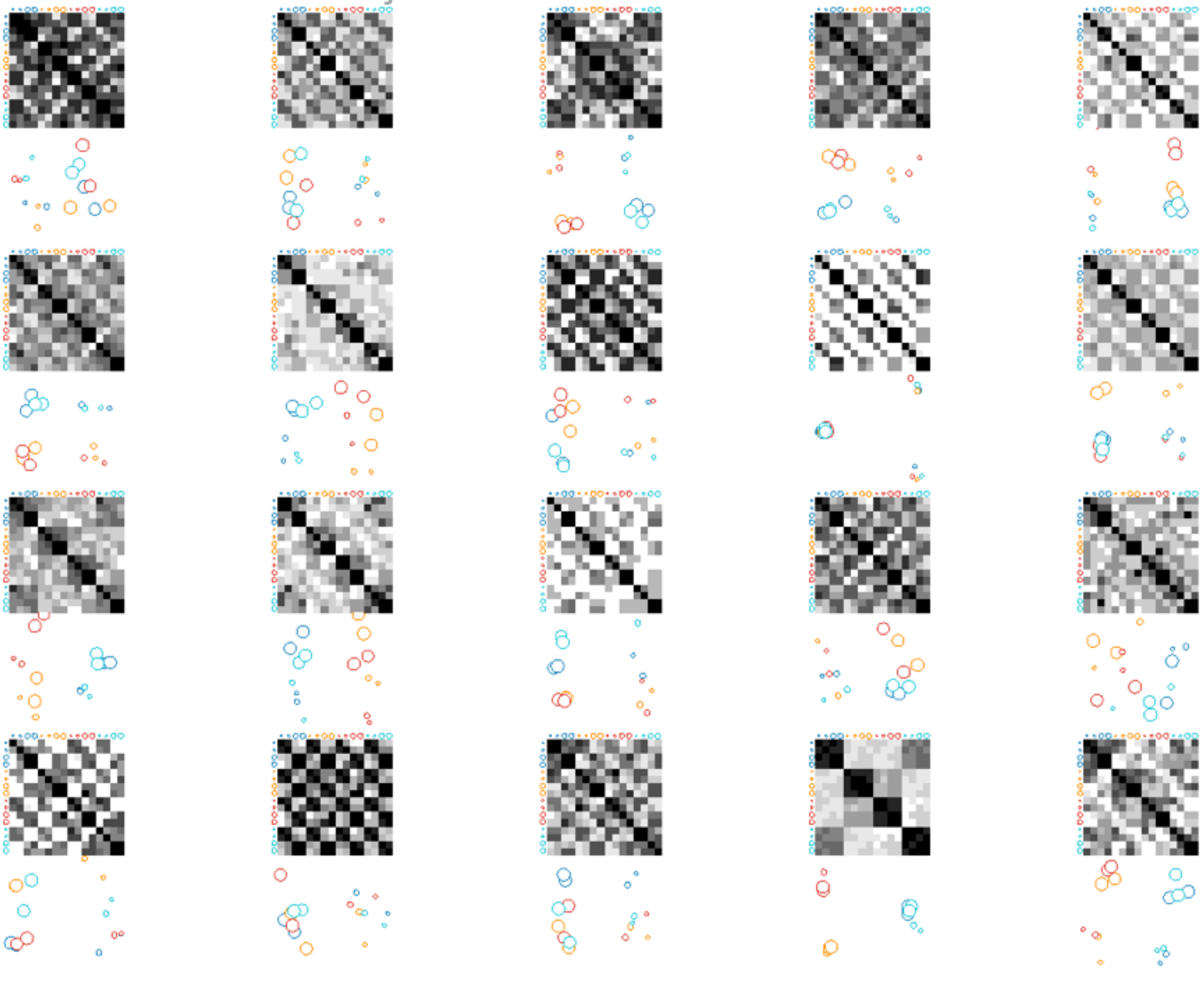
Per-subject Kernels: Shape-Color-Td



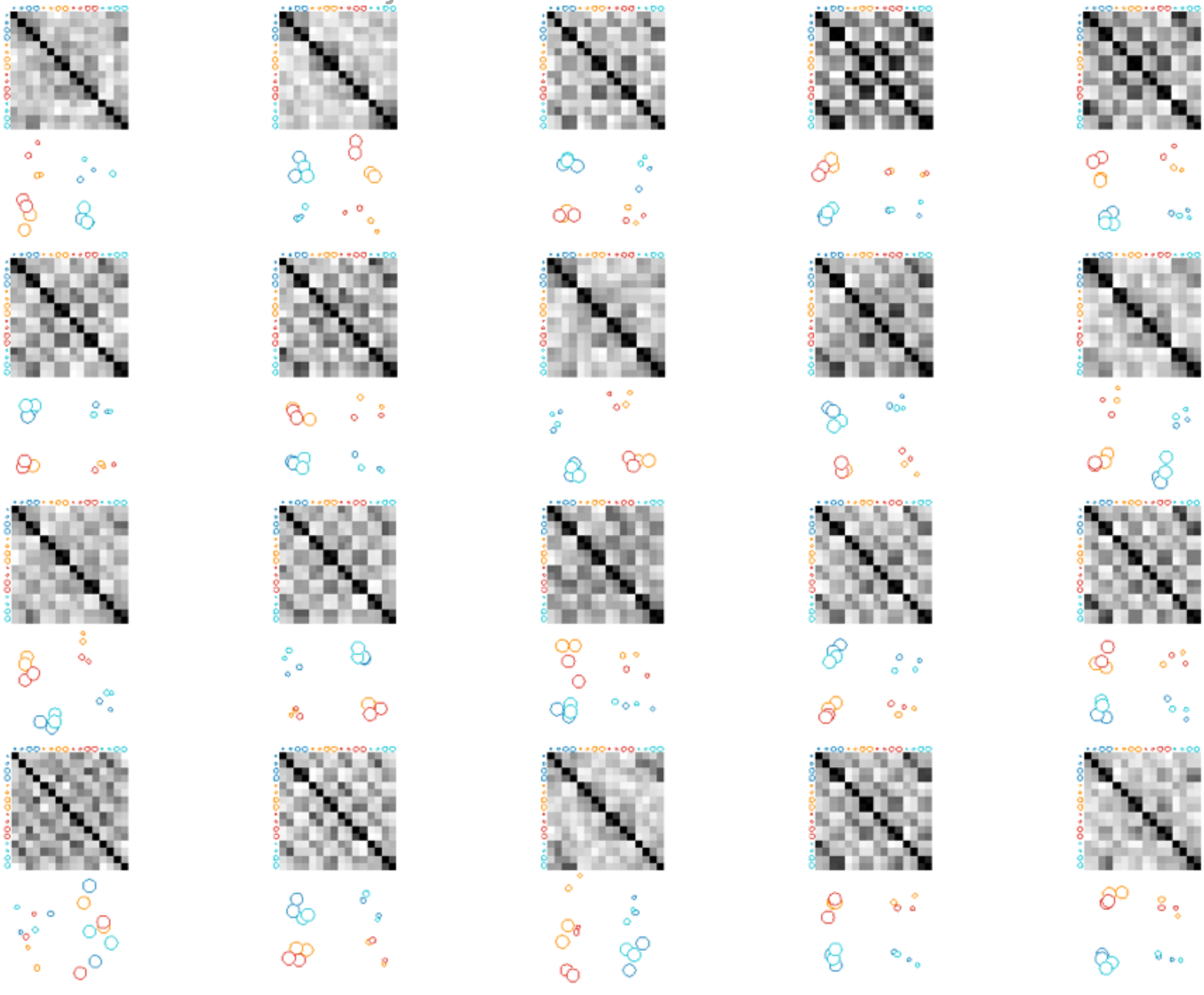
Per-subject Kernels: Size-Color-L5



Per-subject Kernels: Size-Color-L9

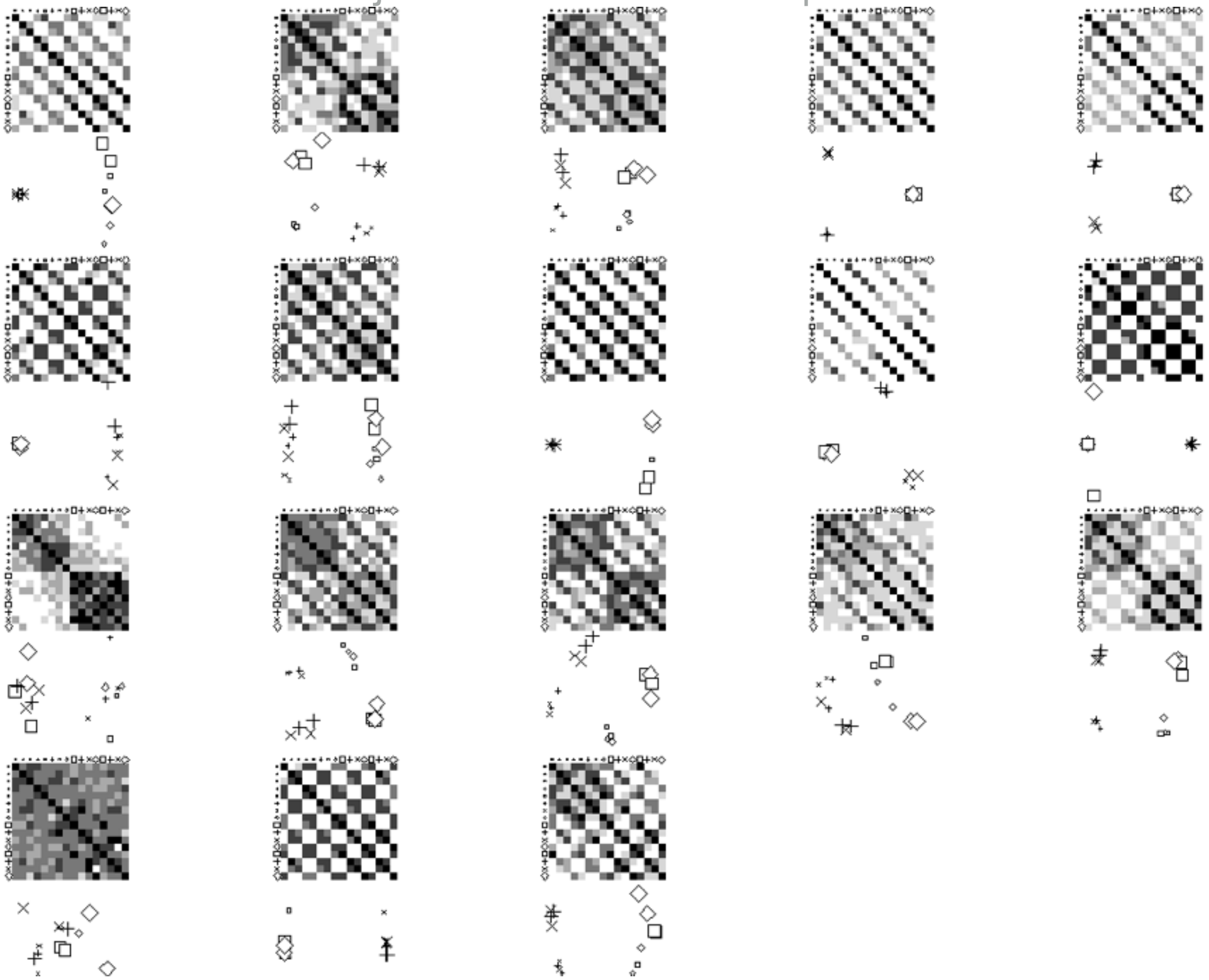


Per-subject Kernels: Size-Color-Tm

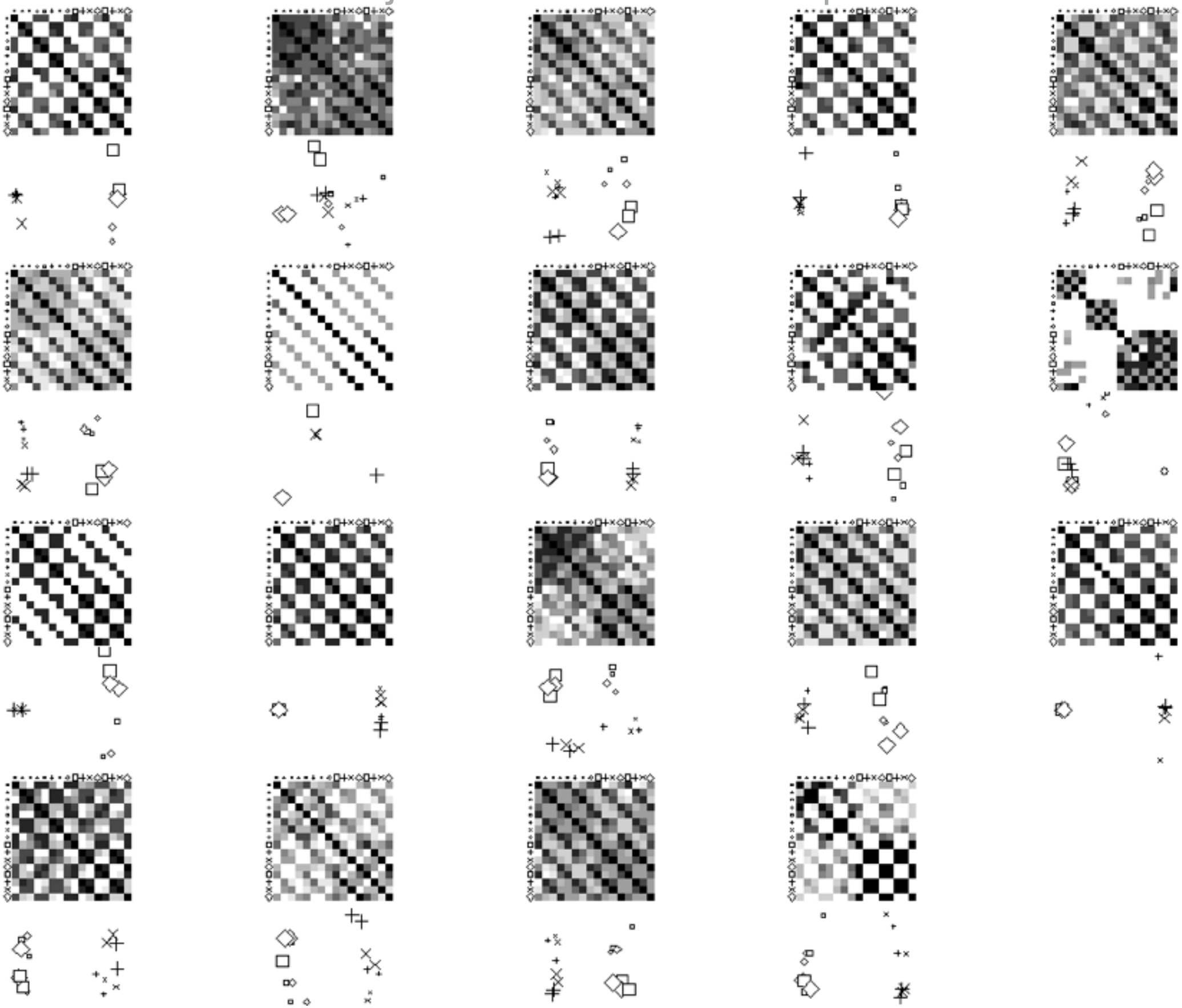


Per-subject Kernels: Size-Color-Td

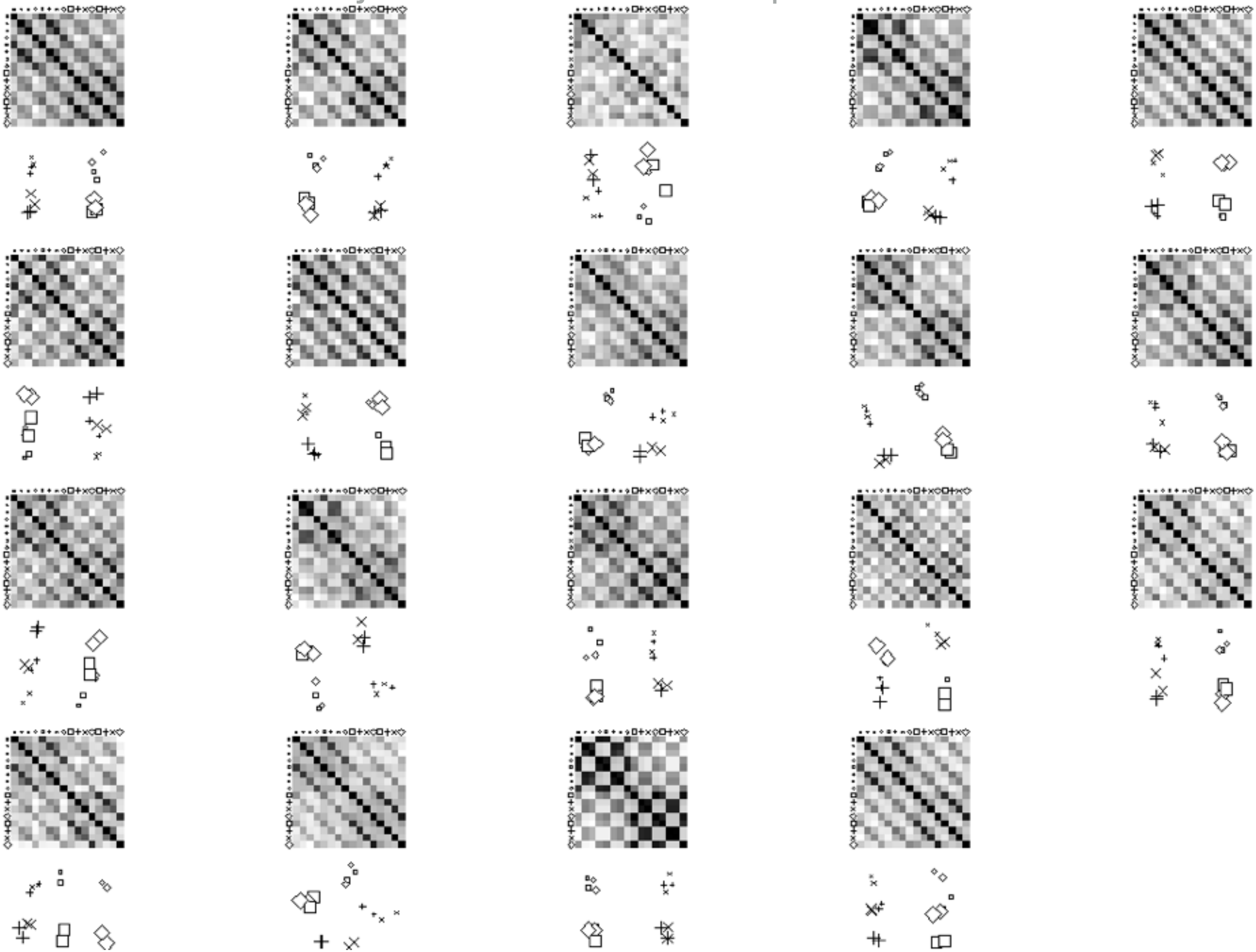
Per-subject Kernels: Shape-Size-L5



Per-subject Kernels: Shape-Size-L9



Per-subject Kernels: Shape-Size-Tm



Per-subject Kernels: Shape-Size-Td