Supplementary Tables

Table S1: Experiment B pilot results: EEGNet with Riemannian geometry on BigP3BCI ($n = 12$). **(a)** Per-subject LOSO AUC for four EEGNet configurations. B1 = EEGNet baseline (Euclidean Alignment only); B2 = EEGNet + Riemannian mean alignment; B3 = EEGNet + LWF shrinkage + RA; C = EEGNet + OAS shrinkage + RA. **(b)** Pairwise Wilcoxon signed-rank tests ($n = 12$, Bonferroni-corrected $\alpha = 0.0125$).

(a) Per-subject AUC

Subject	B1 EEGNet+EA	B2 EEGNet+RI	B3 EEGNet+LWF+RA	C EEGNet+OAS+RA
A_01	0.4940	0.4739	0.4892	0.4807
A_02	0.5239	0.4979	0.5042	0.4970
A_03	0.5148	0.4947	0.5031	0.5118
A_04	0.4989	0.4950	0.5223	0.5173
A_05	0.5266	0.4838	0.5011	0.4943
A_06	0.5017	0.4996	0.5169	0.5403
A_07	0.4724	0.5057	0.4910	0.4995
A_09	0.4910	0.4876	0.5111	0.4853
A_14	0.5320	0.4761	0.5062	0.5003
A_15	0.5219	0.5242	0.5162	0.4966
A_16	0.4960	0.5084	0.4726	0.5393
A_19	0.5062	0.5056	0.4923	0.5082
Mean	**0.5066**	**0.4960**	**0.5022**	**0.5059**

(b) Wilcoxon signed-rank tests

Hypothesis	ΔAUC	p	d_z	Sig.
HB1: Riemann mean adds value to EEGNet EA	-0.0106	0.1294	-0.438	
HB2: LWF+RA vs SCM+EA baseline	-0.0044	0.4238	-0.235	
HB3: LWF estimator vs SCM in RA	+0.0061	0.2334	0.305	
HC: OAS vs SCM in EEGNet RA	+0.0098	0.0923	0.530	

Table S2.1: Per-subject LOSO AUC — ERPCovariance ablation, BNCI2014_009 ($n = 10$). Configurations A1–A5 as defined in Table 2.

Subject	A1 SCM+EA	A2 LWF+EA	A3 LWF+RA	A4 OAS+RA	A5 OAS+EA
S1	0.5140	0.5890	0.5890	0.6223	0.6223
S2	0.5259	0.5806	0.5806	0.6242	0.6242
S3	0.5471	0.6144	0.6144	0.6560	0.6560
S4	0.5459	0.6261	0.6261	0.6931	0.6931
S5	0.5744	0.6726	0.6726	0.7528	0.7528
S6	0.5176	0.6431	0.6431	0.7269	0.7269
S7	0.5330	0.5926	0.5926	0.6988	0.6988
S8	0.4868	0.6233	0.6233	0.7134	0.7134
S9	0.5580	0.7448	0.7448	0.8251	0.8251
S10	0.5181	0.7176	0.7176	0.7912	0.7912
Mean	**0.5321**	**0.6404**	**0.6404**	**0.7104**	**0.7104**

Table S2.2: Per-subject LOSO AUC — ERPCovariance ablation, BI2013a ($n = 24$). Configurations A1–A5 as defined in Table 2.

Subject	A1 SCM+EA	A2 LWF+EA	A3 LWF+RA	A4 OAS+RA	A5 OAS+EA
S1	0.6342	0.6649	0.6649	0.6792	0.6711
S2	0.5559	0.5559	0.5559	0.6018	0.5905
S3	0.5309	0.5329	0.5329	0.5531	0.5466
S4	0.6473	0.6711	0.6711	0.7077	0.6928
S5	0.5606	0.5977	0.5977	0.6368	0.6215
S6	0.5513	0.5798	0.5798	0.6122	0.5873
S7	0.5536	0.6226	0.6226	0.6718	0.6180
S8	0.5870	0.6149	0.6149	0.6409	0.6159
S9	0.5488	0.6568	0.6568	0.6865	0.6356
S10	0.6339	0.6434	0.6434	0.6701	0.6521
S11	0.6465	0.7004	0.7004	0.7476	0.6865
S12	0.5697	0.6122	0.6122	0.6498	0.6245
S13	0.5634	0.5926	0.5926	0.5826	0.5856
S14	0.5892	0.6799	0.6799	0.7133	0.6721
S15	0.6572	0.7468	0.7468	0.7861	0.7438
S16	0.5971	0.7098	0.7098	0.7358	0.7050
S17	0.5148	0.5841	0.5841	0.5797	0.5586
S18	0.5503	0.8093	0.8093	0.8337	0.7450
S19	0.6151	0.6549	0.6549	0.7014	0.6614
S20	0.4877	0.6120	0.6120	0.5975	0.5247
S21	0.5460	0.7526	0.7526	0.7628	0.6460
S22	0.5896	0.6981	0.6981	0.7025	0.6468
S23	0.6435	0.6878	0.6878	0.7043	0.6794
S24	0.5262	0.6719	0.6719	0.6906	0.6287
Mean	**0.5791**	**0.6522**	**0.6522**	**0.6770**	**0.6391**

Table S2.3: Per-subject LOSO AUC — FUCONE ensemble, BNCI2014_009 ($n = 10$). Configurations F0–F4 as defined in Table 3.

Subject	F0 ERPCov	F1 +Cov	F2 +Coh	F3 +Full	F4 All
S1	0.5890	0.5705	0.5852	0.5903	0.5766
S2	0.5806	0.5589	0.5793	0.5801	0.5628
S3	0.6144	0.5952	0.6143	0.6106	0.5948
S4	0.6261	0.6064	0.6256	0.6261	0.6090
S5	0.6726	0.6496	0.6759	0.6721	0.6533
S6	0.6431	0.5873	0.6057	0.5772	0.5725
S7	0.5926	0.5551	0.5739	0.5716	0.5558
S8	0.6233	0.5997	0.6074	0.6095	0.5944
S9	0.7448	0.7161	0.7255	0.7029	0.6880
S10	0.7176	0.5965	0.6136	0.5805	0.5693
Mean	**0.6404**	**0.6035**	**0.6206**	**0.6121**	**0.5976**

Table S2.4: Per-subject LOSO AUC — FUCONE ensemble, BI2013a ($n = 24$). Configurations F0–F4 as defined in Table 3.

Subject	F0 ERPCov	F1 +Cov	F2 +Coh	F3 +Full	F4 All
S1	0.6649	0.6559	0.6519	0.6520	0.6513
S2	0.5559	0.5525	0.5392	0.5392	0.5464
S3	0.5329	0.5320	0.5376	0.5376	0.5326
S4	0.6711	0.6507	0.5666	0.5666	0.6212
S5	0.5977	0.5540	0.5507	0.5507	0.5644
S6	0.5798	0.5769	0.5711	0.5711	0.5747
S7	0.6226	0.5882	0.6288	0.6288	0.5917
S8	0.6149	0.6075	0.6176	0.6176	0.6077
S9	0.6568	0.6328	0.6567	0.6567	0.6328
S10	0.6434	0.6354	0.6366	0.6366	0.6332
S11	0.7004	0.6826	0.6698	0.6698	0.6754
S12	0.6122	0.5961	0.6078	0.6078	0.5959
S13	0.5926	0.5791	0.5731	0.5731	0.5758
S14	0.6799	0.6660	0.6790	0.6790	0.6658
S15	0.7468	0.6839	0.6852	0.6852	0.6793
S16	0.7098	0.6379	0.6474	0.6474	0.6285
S17	0.5841	0.5568	0.5834	0.5834	0.5543
S18	0.8093	0.7865	0.8115	0.8115	0.7896
S19	0.6549	0.6470	0.6527	0.6527	0.6452
S20	0.6120	0.5595	0.6079	0.6079	0.5585
S21	0.7526	0.7313	0.7508	0.7508	0.7305
S22	0.6981	0.6755	0.7018	0.7018	0.6769
S23	0.6878	0.6599	0.6615	0.6615	0.6588
S24	0.6719	0.6512	0.6715	0.6715	0.6506
Mean	**0.6522**	**0.6291**	**0.6358**	**0.6358**	**0.6267**