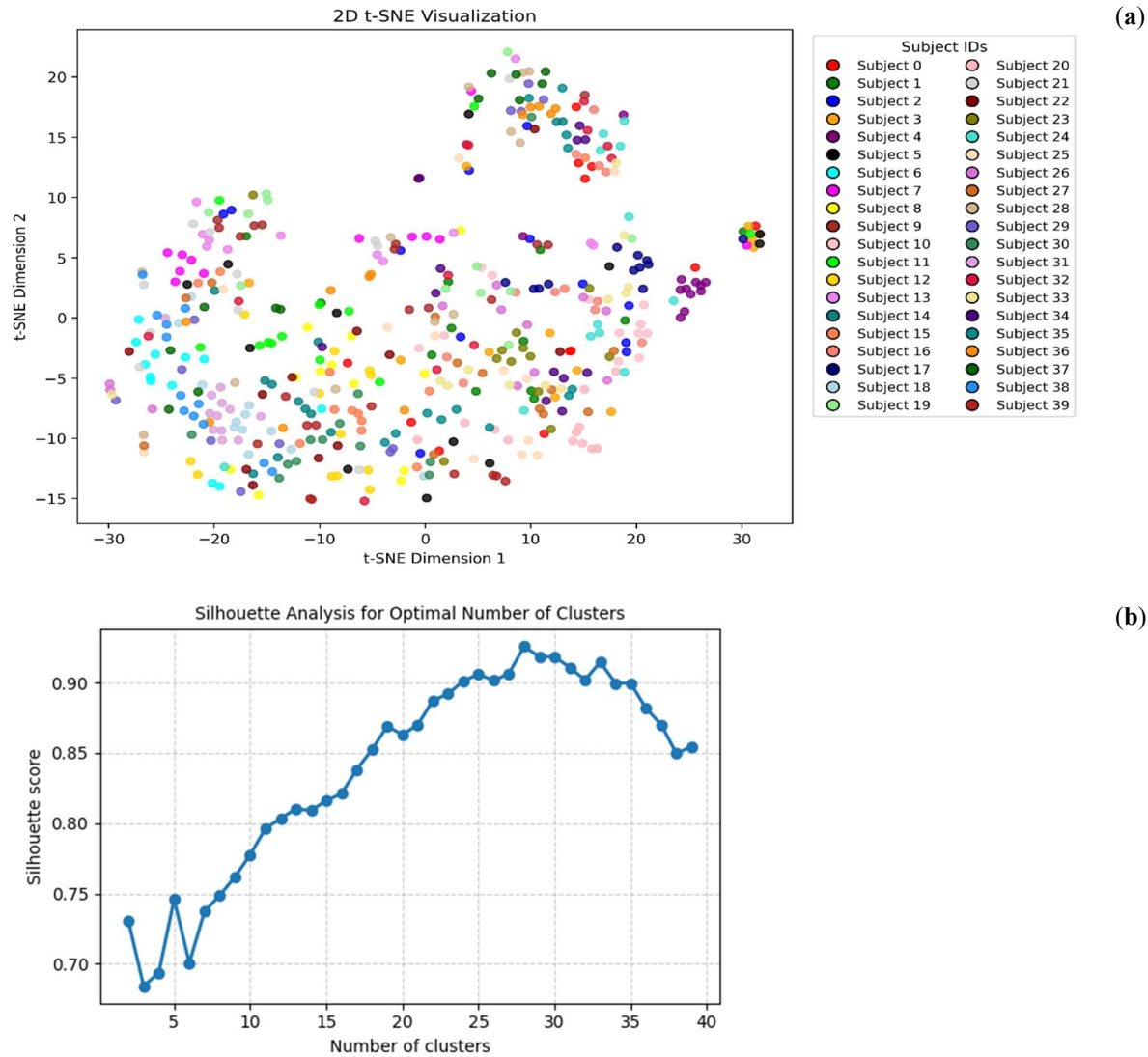


1 **Supplementary Information**

2



3 Figure S1. Exploratory visualization of EEG feature-space variability across subjects and recording blocks.
4 (a) Two-dimensional projection of EEG features using t-distributed stochastic neighbor embedding (t-SNE) [1]. Each point
5 represents a single CBS block, and colors indicate subject identity (ID 0–39), illustrating substantial inter-subject variability in the
6 feature space derived from Cz, Pz, and Fz channels. t-SNE is used here solely for qualitative visualization; the resulting projections
7 depend on initialization and hyperparameter settings and therefore should not be interpreted as evidence of definitive separability
8 or clustering. (b) Silhouette analysis [2] of the EEG feature space across a range of cluster numbers, performed to provide
9 quantitative support for the heterogeneous structure suggested by the t-SNE visualization. The analysis indicated the presence of
10 multiple clusters within the data, consistent with substantial inter-subject variability in the EEG feature space.
11 Table S1. Comparison of eyes-open and eyes-closed resting-state conditions before the driving test in predicting driving
12 performance. CatBoost classifier was evaluated using leave-one-out cross-validation. Results are reported as precision, recall, and
13 F-score for Safe and Risky classes, along with macro and weighted averages.

		Precision	Recall	F1-score
	Safe driving	0.57	0.53	0.55

Eyes-open	Risky driving	0.61	0.65	0.63
	Macro Avg	0.59	0.59	0.59
	Weighted Avg	0.59	0.59	0.59
Eyes-close	Safe driving	0.70	0.67	0.69
	Risky driving	0.72	0.75	0.73
	Macro Avg	0.71	0.71	0.71
	Weighted Avg	0.71	0.71	0.71

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2 Table S2. Precision, recall, and F1-score in the eyes-closed condition, comparing channels Fz, Cz, and Pz for Safe and Risky
3 driving, along with weighted average. CatBoost used for classification.

		Precision	Recall	F1-score
Pz	Safe driving	0.76	0.77	0.76
	Risky driving	0.77	0.75	0.76
	Weighted Avg	0.76	0.76	0.76
Cz	Safe driving	0.70	0.66	0.68
	Risky driving	0.68	0.72	0.70
	Weighted Avg	0.69	0.69	0.69
Fz	Safe driving	0.58	0.50	0.53
	Risky driving	0.56	0.64	0.60
	Weighted Avg	0.57	0.57	0.57

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6 Table S3. Comparison of Delta, Theta, Alpha, and Beta frequency sub-bands in the eyes-closed condition for predicting driving
7 performance. CatBoost was evaluated using leave-one-out cross-validation. Results are reported as precision, recall, and F1-score
8 for Safe and Risky driving, along with weighted average.

		Precision	Recall	F1-score
Delta	Safe driving	0.69	0.73	0.71
	Risky driving	0.71	0.68	0.69
	Weighted Avg	0.70	0.70	0.70
Theta	Safe driving	0.68	0.58	0.62
	Risky driving	0.64	0.74	0.68
	Weighted Avg	0.66	0.66	0.65
Alpha	Safe driving	0.57	0.49	0.53
	Risky driving	0.56	0.64	0.60
	Weighted Avg	0.57	0.56	0.56
Beta	Safe driving	0.40	0.41	0.41
	Risky driving	0.41	0.40	0.41
	Weighted Avg	0.41	0.41	0.41

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1 References

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