Are Faces, Places, and Objects Encoded in the Same Locations across Individual Brains?

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Abstract

Whole-brain decoding can test whether semantic category information is localized and shared across people or distributed and individualized. We evaluated Iterated LASSO (iLASSO), a two-stage procedure that iteratively selects predictive voxels with L1-regularized multinomial classifiers and estimates category-wise contributions with ridge-regularized fitting. Using nested cross-validation, we applied iLASSO to two independently collected face/place/object fMRI datasets. In both datasets, iLASSO achieved above-chance held-out accuracy (JLP: N=8, M=83.5%, SD=6.0%, p<.001; Neural Fingerprints: N=35 scans, M=60.7%, SD=13.4%, p<.001), comparable to standard LASSO (JLP: M=86.4%, SD=8.0%, p=.11; Neural Fingerprints: M=60.9%, SD=13.5%, p=.85) while selecting more voxels. Decoded coefficient maps revealed face, place, and object information distributed across all four cortical lobes, extending beyond classical category-selective regions. Many selected voxels showed graded multi-category coefficient profiles rather than category-exclusive selectivity, with substantial variation across subjects.

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