**Decoding:**

SCRIPTS:

The Specificity Index (SI) can be calculated using *calculate\_SI\_cl.m* (see help therein). To calculate SI for a range of K and PCs use *calculate\_SI\_batch\_cl.m*.

To recreate pairwise comparisons in **Figure.3c** use *figure\_specificity\_all\_cl.m*. To recreate **Supplementary Figure.5a,b** and the last bar in **Figure.3c** use *figure\_specificity\_K\_PC\_cl.m*. Those scripts also provide statistical comparisons based on sign-test.

K-Nearest Neighbour decoding is performed using *decode\_cl.m* (see help therein). To calculate decoding accuracy for pairs of stimuli and for a range of K and PCs use *decode\_batch\_cl.m*. To calculate decoding accuracy for 0-2s epochs for pairs of stimuli (**Figure.4b**) and for all three stimuli (**Figure.4c**) use the script *decode\_batch\_2s\_cl.m*. This script makes the figures (see help therein). For statistical comparisons this script (and also *figure\_decoding\_K\_PC\_cl.m)* uses the binomial test script *myBinomTest.m* which was made by Matthew Nelson (<https://uk.mathworks.com/matlabcentral/fileexchange/24813-mybinomtest-s-n-p-sided>).

For pairwise comparisons in **Figure.4a**, **Supplementary Figure.6c** use *figure\_decoding\_all\_scatter\_cl.m*. To recreate **Supplementary** **Figure.6a,b** use *figure\_decoding\_K\_PC\_cl.m.*

DATA:

Results for SI calculations can be found as *.mat* files and are named as *SIinv\**. Results from KNN and Random Forest decoding are *results\_stimulus\_predict\_knn\_review.mat* (pairwise comparisons between pairs of stimuli in 1s epochs) while those and *results\_ stimulus\_predict\_0\_2s\_knn\_review.mat* (for all stimuli in the 0-2s epoch).Results for pairwise decoding of 1s epochs with Random Forest can be found in *results\_stimulus\_predict\_rf\_review.mat*.