# Supplementary Material

Automated classification of cognitive state based on event-related potential biomarkers:

To determine the extent to which cognitive state can be objectively determined from passive ERP biomarkers alone (i.e. from the two-dimensional coordinates of Figure 4, we constructed an ordinal regression model that decoded the outputs of three binary logistic-regression classifiers with balanced class re-weighting, and a low regularization constant chosen *a-priori*. Training the algorithm consisted of training one such classifier to distinguish DoC from CS, CI and TD, a second to distinguish DoC and CS from CI and TD, and a third to distinguish DoC, CS and CI from TD. The DoC data from subjects A, C and E were excluded from classifier training, on the grounds that their EEG motor-command-following results rendered their labeling as "DoC" questionable. This left 37 measurements (37 of the 40 points in Figure 4). The algorithm was evaluated using a leave-one-out approach—in other words, for each data-point, a machine classification was obtained by decoding the outputs of three binary classifiers that had been trained from scratch on the other 36 data points. The resulting confusion matrix is shown below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Machine Classification: | | | |
| DoC | CS | CI | TD |
| Clinical classification: | DoC | 2 | 1 |  |  |
| CS | 2 | 5 |  |  |
| CI |  | 1 | 10 | 6 |
| TD |  |  | 3 | 7 |

**Table e-1**: Confusion matrix resulting from automated classification of event-related potentials, auditory evoked potential (AEP) and P3.