

Supplementary information for “*Modeling regional changes in dynamic stability during sleep and wakefulness*” by Perez Ipiña et al.

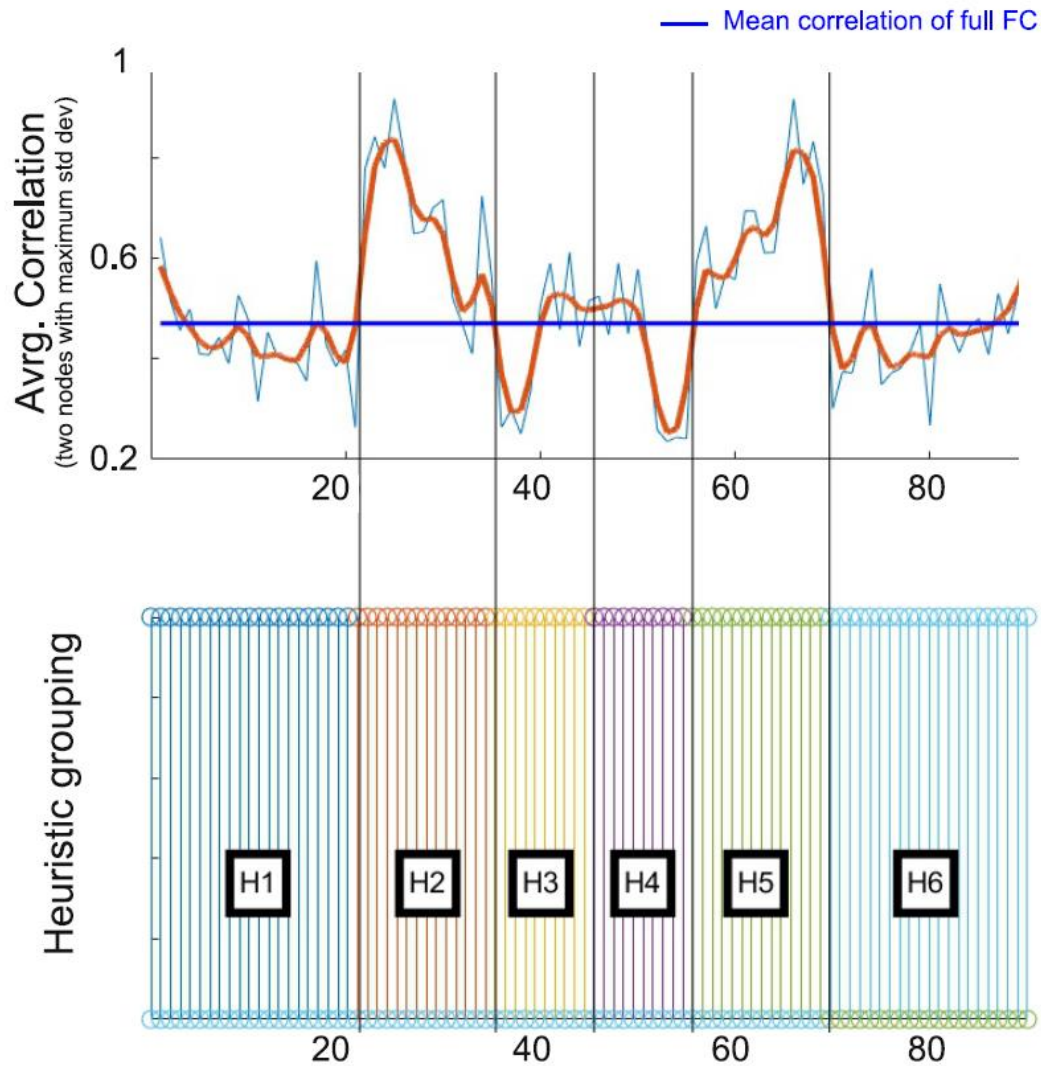


Fig. S1. Procedure followed to construct the “heuristic” node grouping. Top: Average FC of 2 homotopic nodes chosen for their maximal standard deviation (AAL nodes 24 and 66: left and right superior occipital gyrus). The smoothed plot is shown in orange. Bottom: The comparison with the mean FC value clearly outlines the beginning and end of groups H1, H2, H5 and H6. The remaining nodes were split into H3 and H4 to enforce 6 groups and because of symmetry considerations (H3 and H4 belong to the left and right hemispheres, respectively).

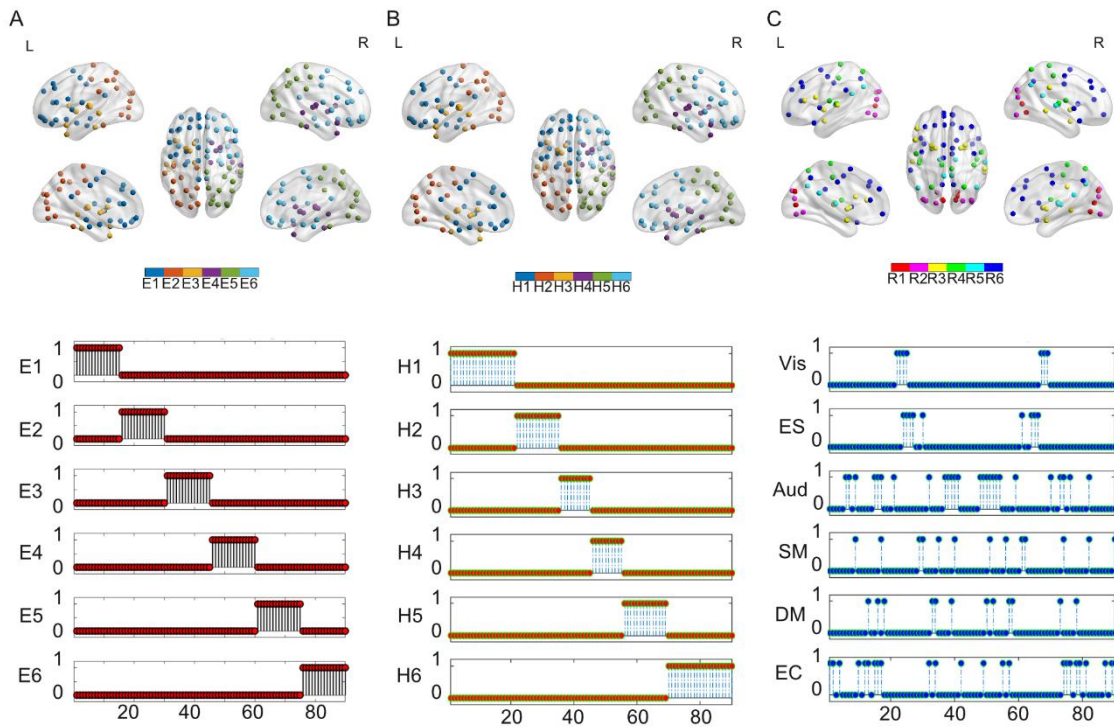


Fig. S2. Top. Anatomical rendering of the nodes, colored by grouping: “equipartition” (panel A), “heuristic” (panel B) and “RSN” (panel C). Bottom: membership for each of the three node groupings.

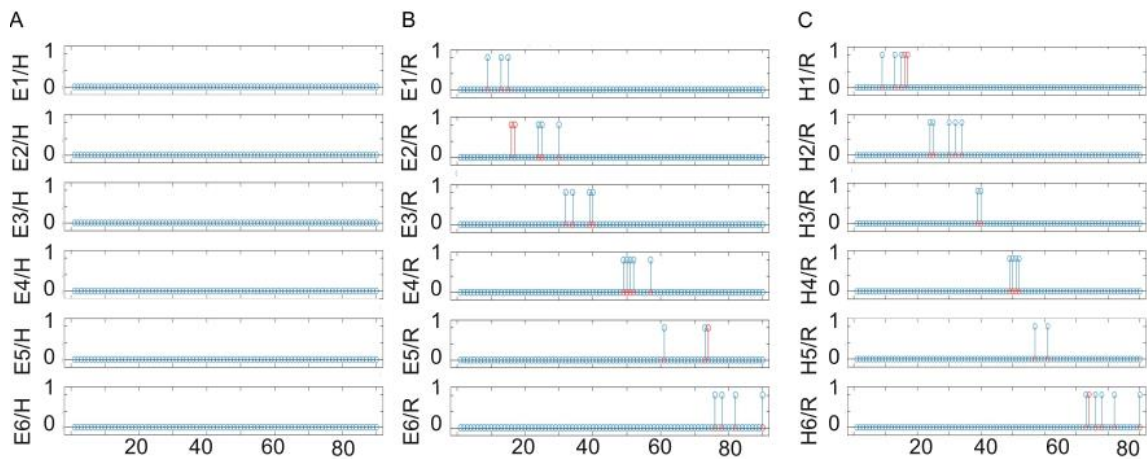


Fig. S3. Array of nodes highlighted by their majority intersection. The selection procedure is as follows. For the comparison between “equipartition” and “heuristic”, we start with group E1, and for every node belonging to E1 and to two other “heuristic” groups (red indicates that the node belongs to more than two groups) that node has the value “1”. This procedure results in an array of 90 values (i.e. one value per node). This is repeated for E2, ..., E6. The results are shown in panel A. Panel B and C show the results obtained starting with “equipartition” and “heuristic” and counting the “RSN” group membership. This method shows how many nodes are shared between groupings by majority voting.

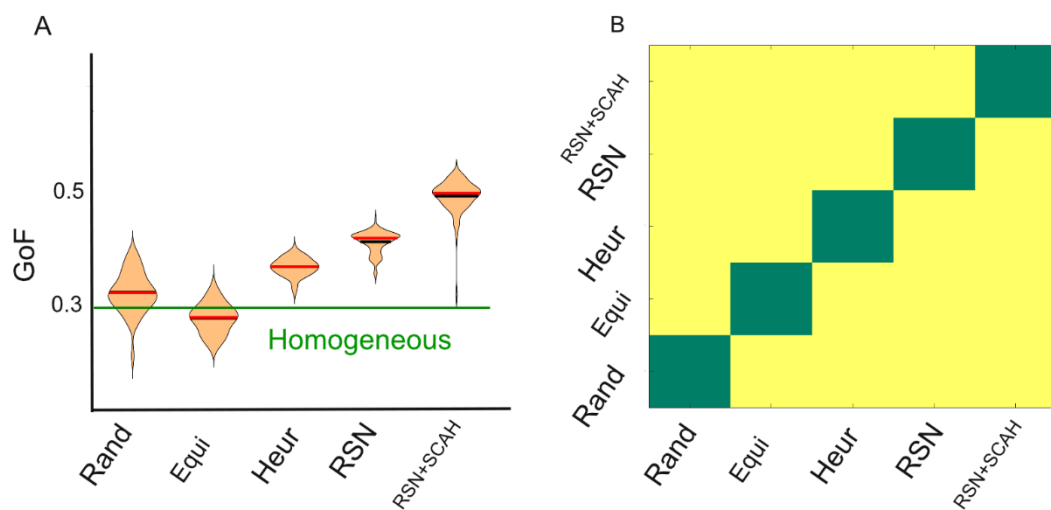


Fig. S4. A) Distribution of GoF values across 100 coefficients optimizations for each grouping (random, equipartition, heuristic, and RSN; the horizontal line indicates the GoF obtained using the homogeneous grouping), with the addition of 100 optimizations using the SC modified to increase the homotopic weights (RSN+SCAH, using RSN prior with an *ad-hoc* increment in the homotopic SC). B) Comparison between the GoF distributions for all pairs of groupings using Cohen's d. The effect sizes for the differences in the means of the distributions are in the highest range of values for all pairs of groupings.

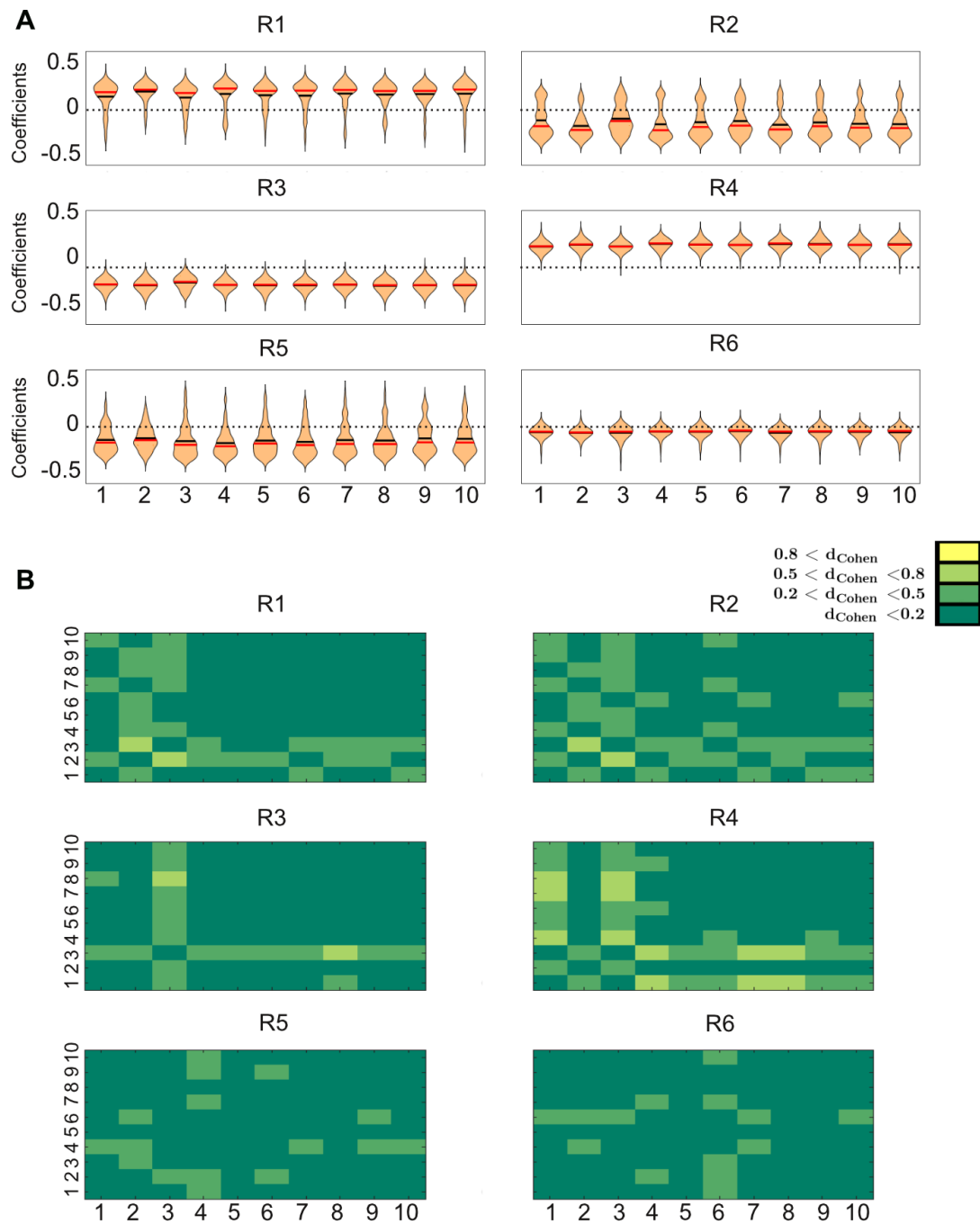


Fig. S5. A) Distribution of R1-R6 (the RSN coefficients corresponding to each group) for 10 repeats of 100 runs of the optimization procedure each. B) Differences in the means of the distributions shown in Panel A, measured using Cohen's d . The effect sizes are in the range of low values, indicating a high degree of robustness of the inferred parameters across each independent repetition of 100 optimizations.

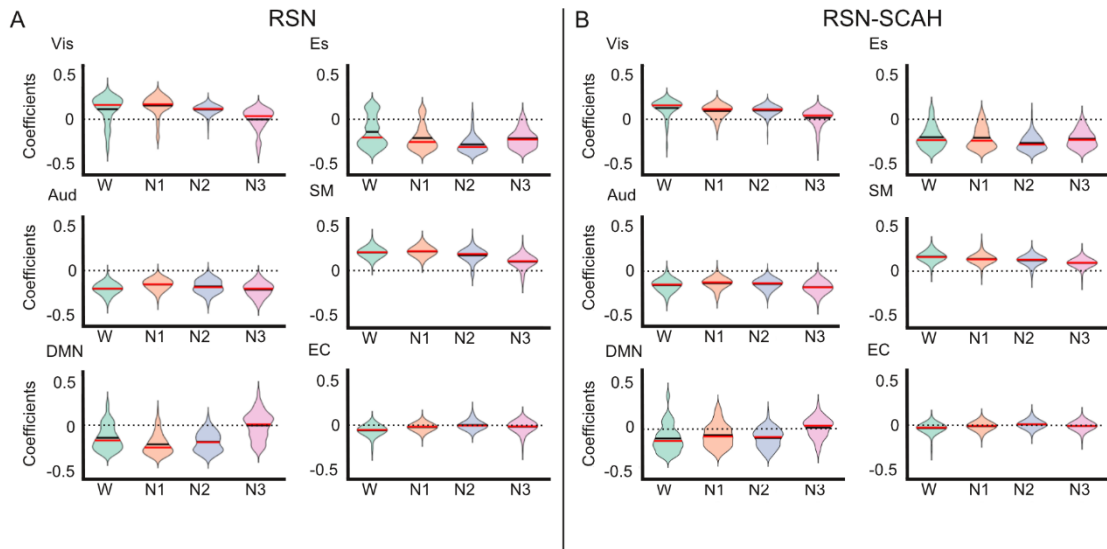


Fig. S6. Distribution of optimal model parameters across 100 runs of coefficients optimizations without (left) and with (right) the ad-hoc modification to the homotopic weights of the SC. This ad-hoc modification shows that a major bottleneck for fitting the empirical FC comes from underestimated homotopic SC weights. However, coefficients fitted using this modification should be analyzed with care, since it represents an arbitrary choice that could have spurious effects on the group coefficients,

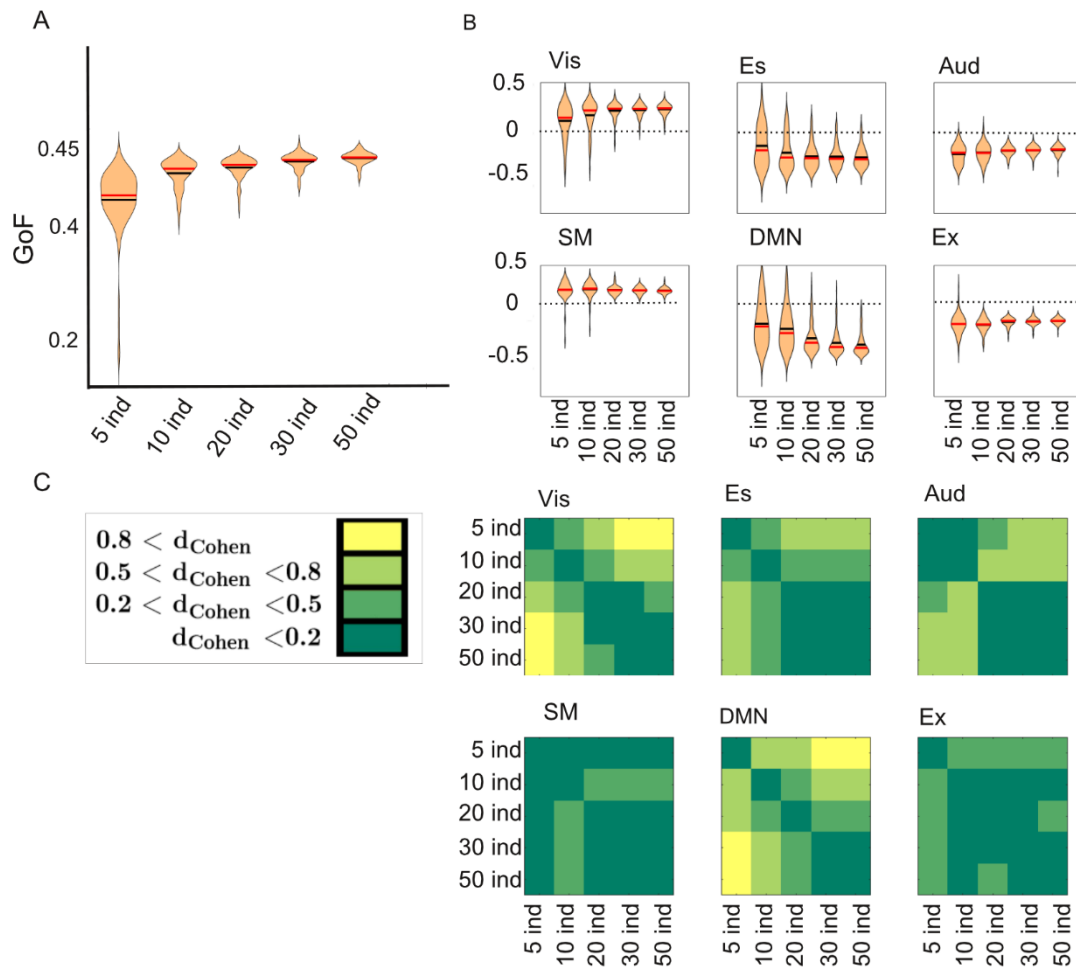


Fig. S7. Panel A shows the GoF violin plots of 100 runs of the optimization procedure for the cases of N (number of individuals per generation) = 5,10, 20, 30 and 50. In panel B is shown the results of the same procedures for the each RSN coefficients distribution. In panel C, the cohen's d comparing the coefficient distributions of each RSN for different N values are shown. As is expected while N increases distributions became narrower. For N=20,30 and 50 the obtained distributions are undistinguishable in terms of its cohen's d in all the RSN. For N=10 distribution coefficients are almost undistinguishable in Ex, SM and Es and slightly similar in Vis, DMN and Aud.

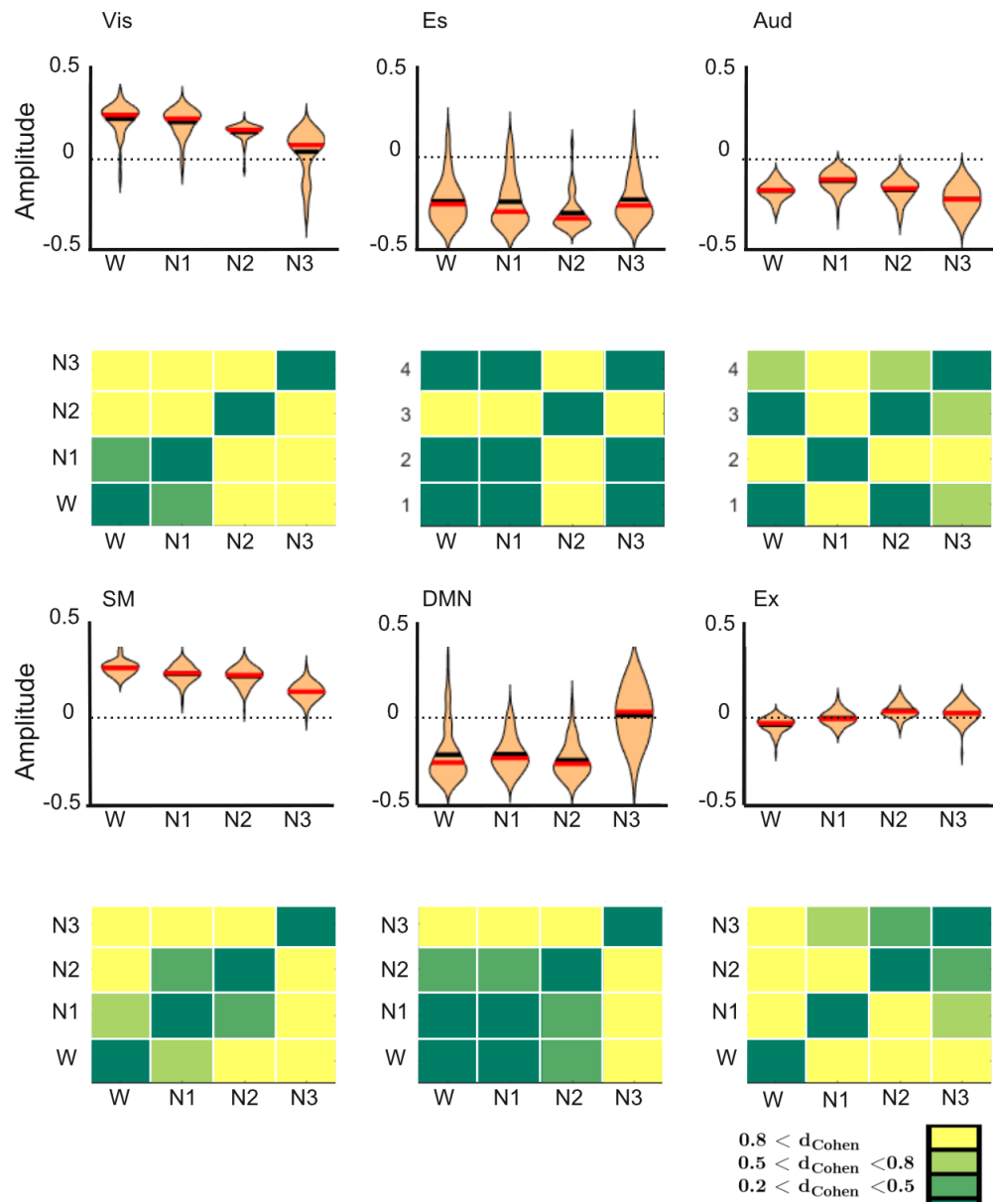


Fig S8: Results obtained using 20 individuals per generation and 100 runs of the optimization procedure. The results obtained in Fig. 6 are reproduced in terms of coefficient behavior along wake-sleep cycle. Sample deviation of coefficients is lower, the more individuals a generation contains, which is consistent with the results shown in Fig S7. Because of that, statistical significance between samples throughout W-N3 for each coefficient is higher.