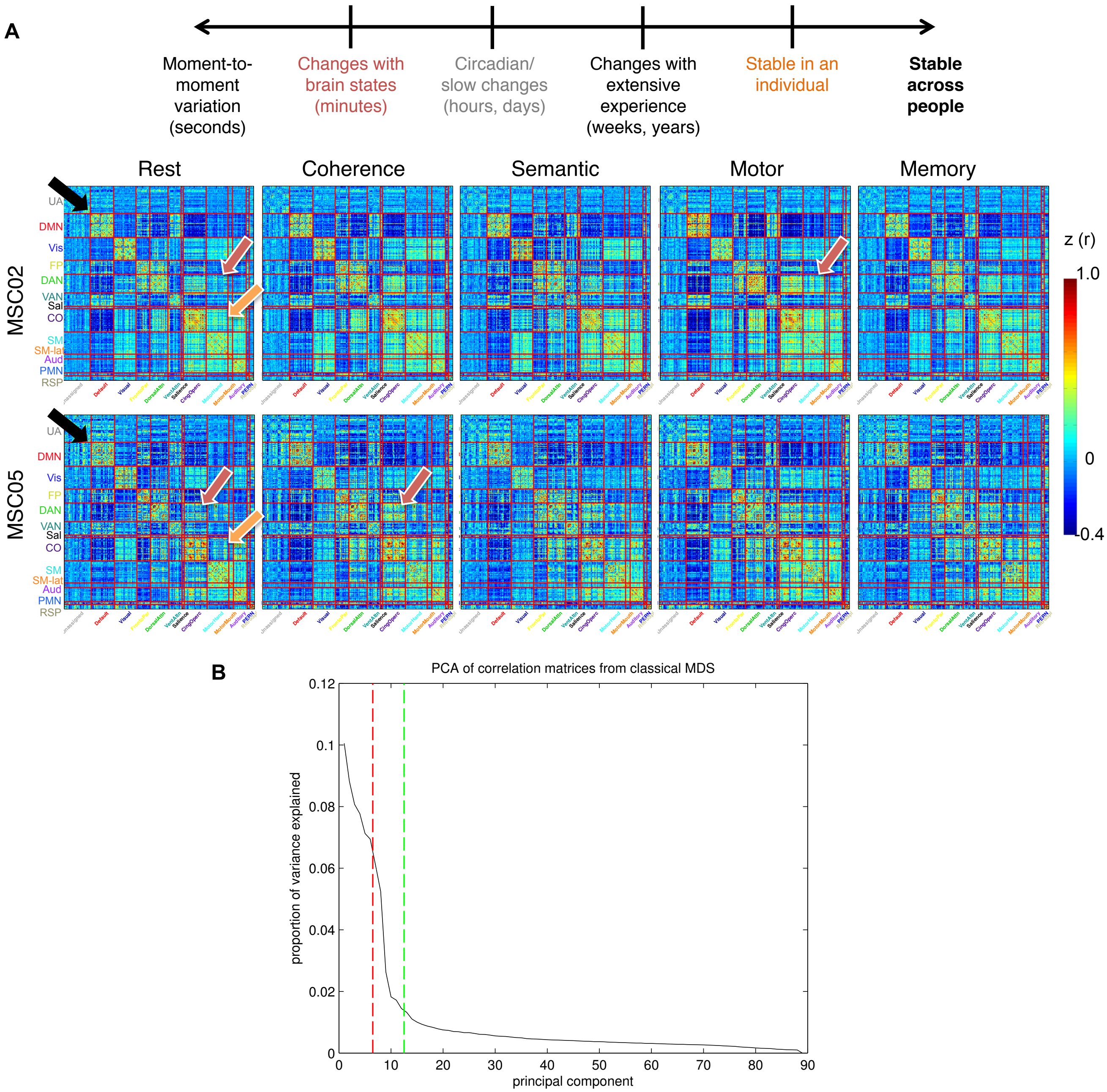
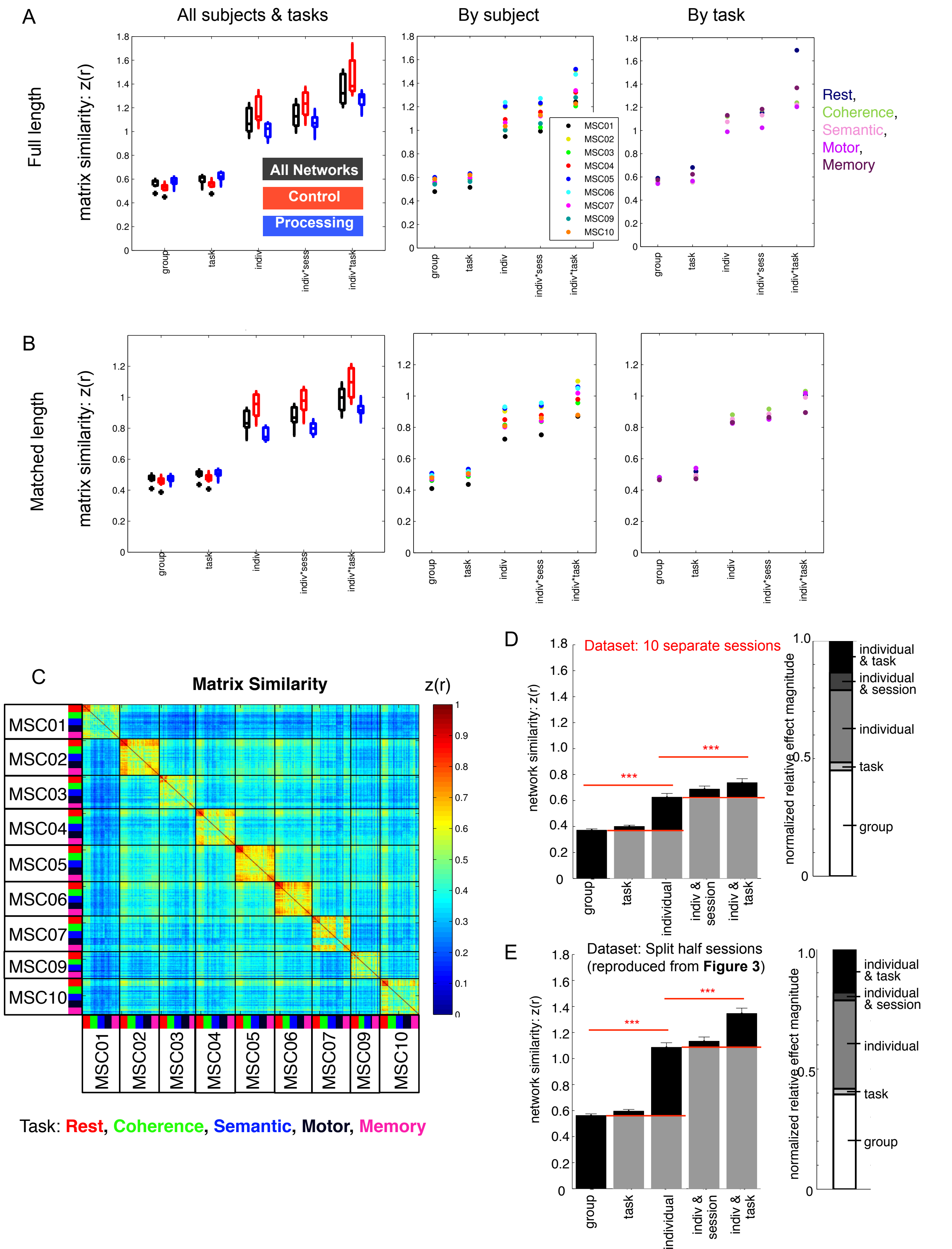
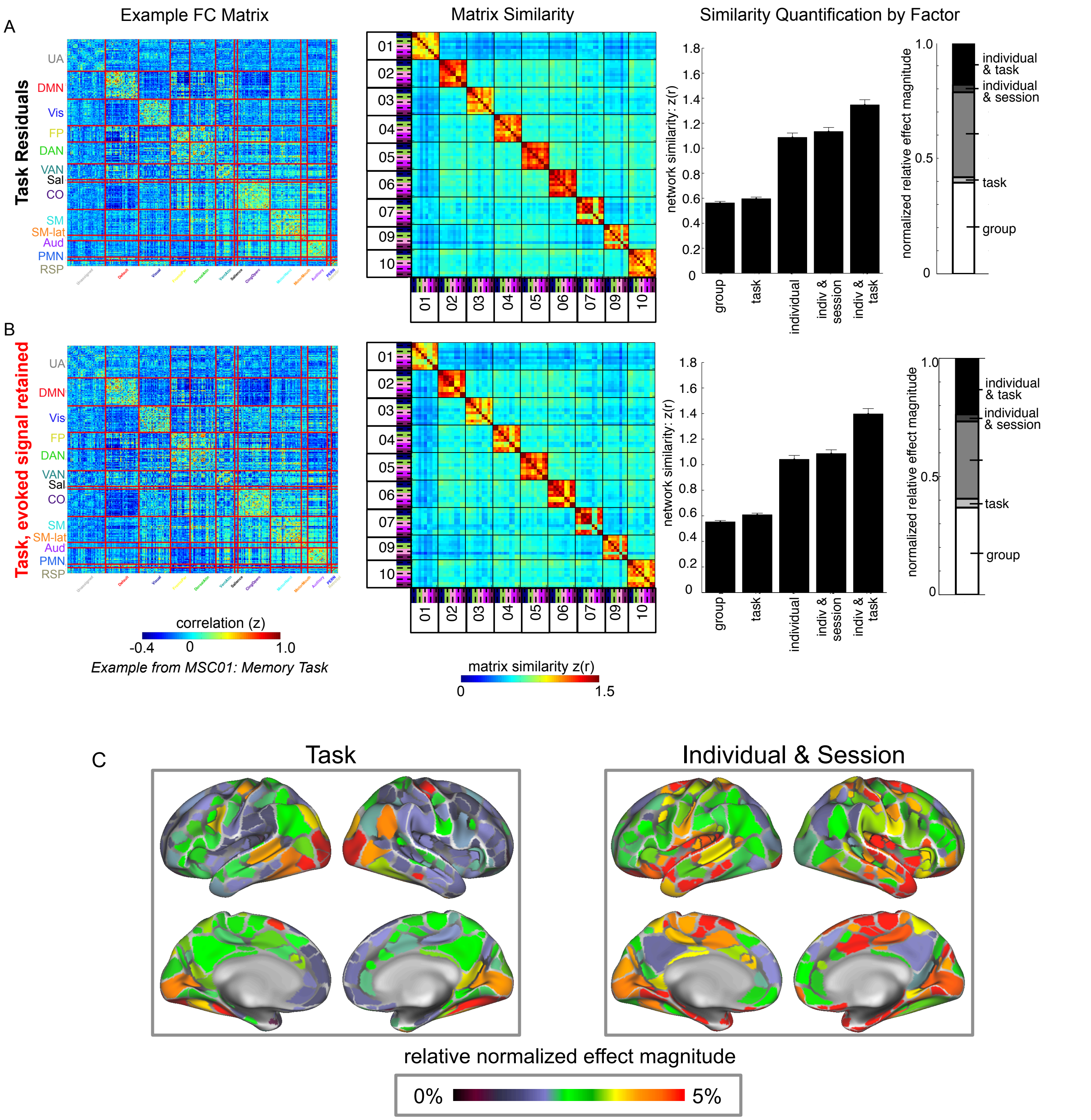
SUPPLEMENTAL FIGURES



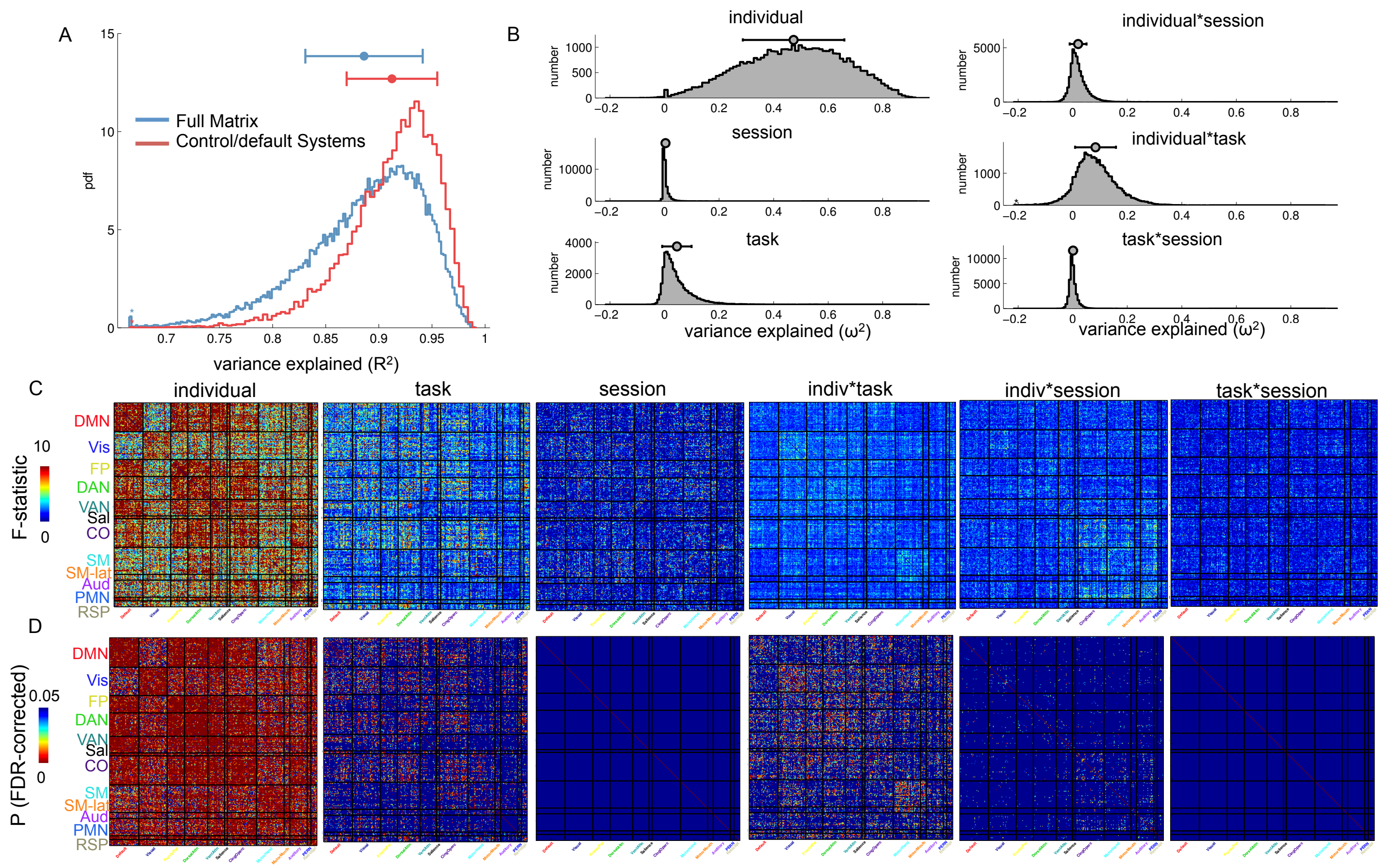
Supp. Fig. 1, Related to Fig. 1 and Fig. 2: (A) Examples of group (black arrows, note similarly high diagonal), subject (orange arrows), and state (red arrows, motor vs. rest in MSC01, motor vs. coherence in MSC05) effects in two highly-sampled individual subjects. We also examine session-level variability (day-to-day; gray – not shown). (B) Principal Component Analysis (PCA) of functional network matrices from classical MDS analysis. The red dashed line divides dimensions 6-7 (early dimensions dominated by subject clustering) from dimensions 12-13 (green dashed line; intermediate dimensions dominated by task clustering), in correspondence with MDS plots from **Figure 2**.



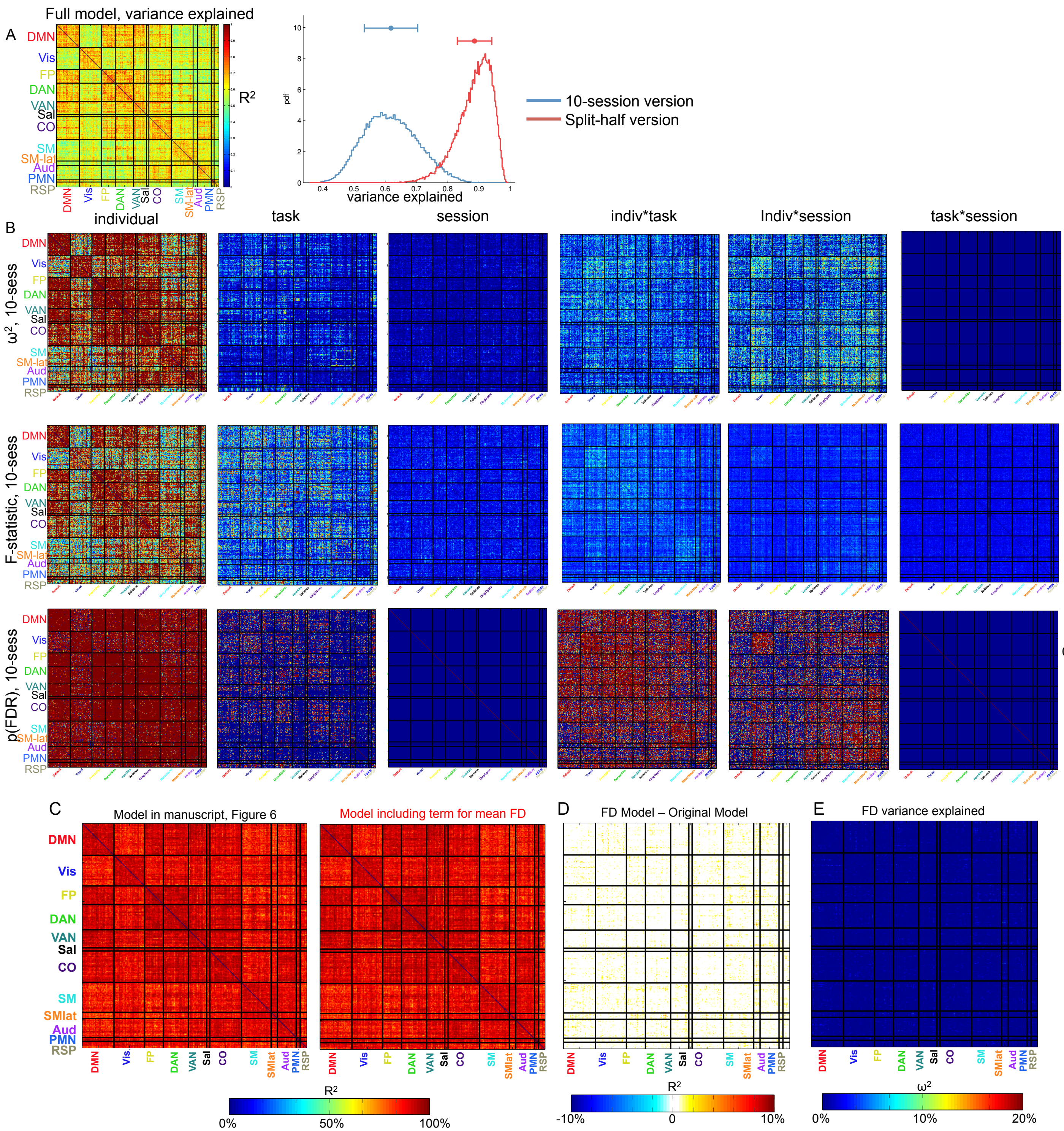
Supp. Fig. 2, Related to Fig. 3: (A, B) Network similarity effects for individual subjects (middle column) and individual tasks (right column) relative to all conditions (left column, separated by system type), in the full denoised dataset (A) as well as a volume matched subset of the data (B). Length matched datasets (matched to have 675 volumes or 24 min., evenly sampled across sessions) exhibited lower network similarity, but had similar patterns across comparison types. Note that task-specific effects are boosted for rest in full-length analysis (probably driven by higher amounts of data in this condition; note the absent of prominent rest effects in length matched datasets), but all tasks still show task*individual interactions. Although effects are quite consistent in pattern across subjects and tasks, individual subjects and tasks show some variation. (C) Network similarity when each session is examined separately. Individual sessions were required to have > 50 good (low-motion) volumes. The overall pattern (D) is quite similar to the split-half session matching (E; all effect types are significantly different from their baselines ($p(FDR)<0.001$). However, the magnitude of all similarity values is substantially diminished, likely reflecting the lower amounts of data per matrix. The normalized relative effect magnitudes (shown to the right of each plot) are quite similar in the two analyses. Note that, while slightly increased, the individual & session effect still remains smaller than the size of the individual & task effect ($p(FDR)<0.005$).



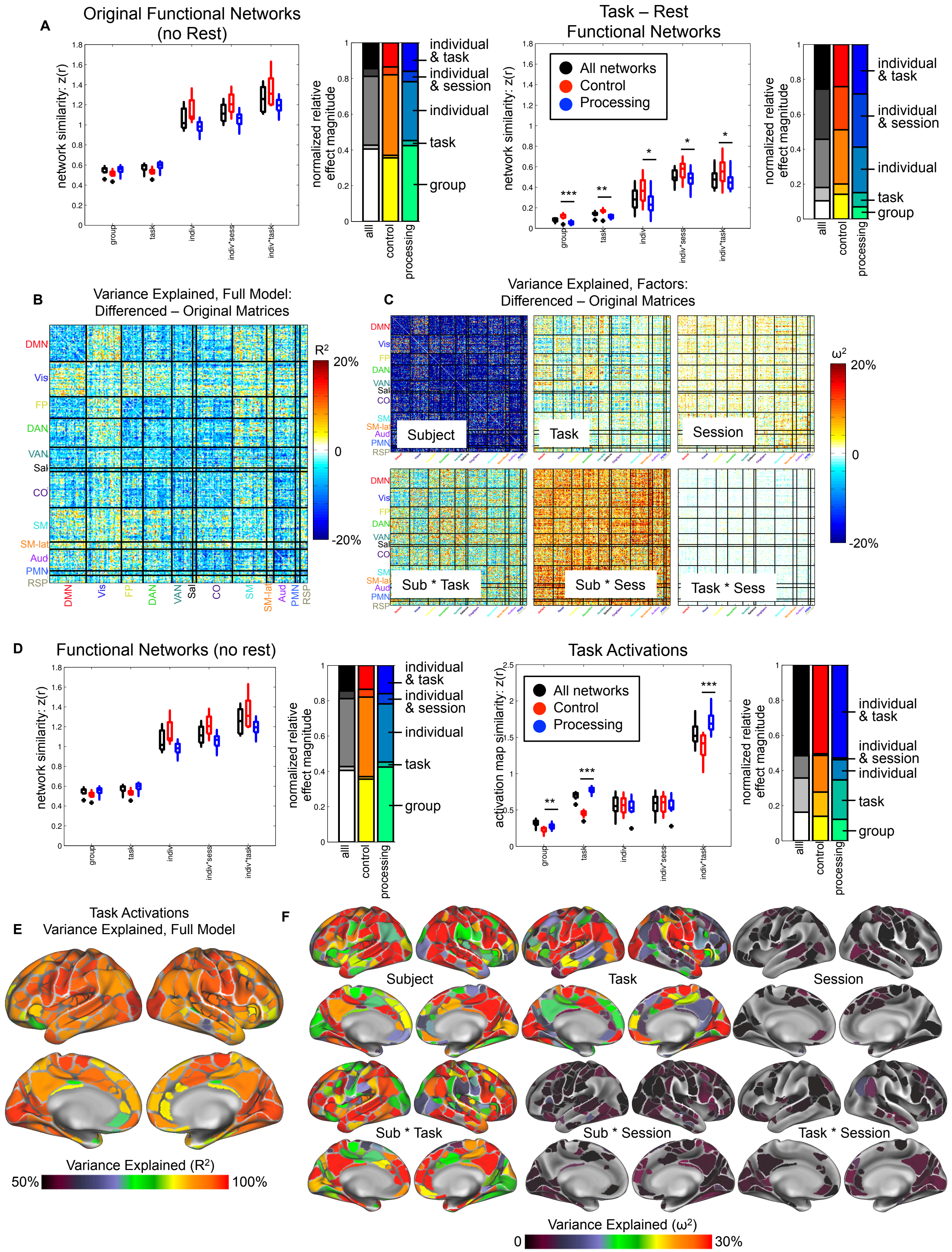
Supp. Fig. 3, Related to Fig. 3 and Fig. 5: (A) Analyses based on task residuals (removing evoked signal components – reproduced from Fig. 3) and (B) analyses based on the complete (i.e., not task-regressed) timeseries where the evoked signal is retained. The first column shows an example FC matrix for each analysis, from MSC01 in the memory task. The second column plots the similarity among networks. The third column quantifies the similarity among matrices matched on different factors. As can be seen, very similar results are obtained, whether task-regressed or complete time-series are used. With complete time-series, task related effects (cross-subject task and individual-specific task) are subtly enhanced. Given ambiguity regarding whether these enhancements are inflated by co-activated responses, we utilize the task residual approach in the main text. (C) The relative normalized effect magnitude for task (left) and individual & session (right) is presented, as in **Figure 5**, but on a narrower colorscale (0-5%) to allow for better discrimination of the topography of effects.



Supp. Fig. 4, Related to Fig. 6: Edge-level ANOVA. (A) Distribution of variance explained across edges in the model for the full brain (blue; does not include low SNR "unassigned" regions) and limited to control/default systems (CO, FP, DAN, VAN, Salience, DMN; red). (B) Histogram of the distributions of variance explained by each factor. (C) F statistic from the model explaining individual functional connections with factors of subject, task, session, and their interactions (D) FDR-corrected p-value associated with each F-statistic (blue: $p > 0.05$). Note that only subject, task, and sub*task variables have a substantial number of significant edges.

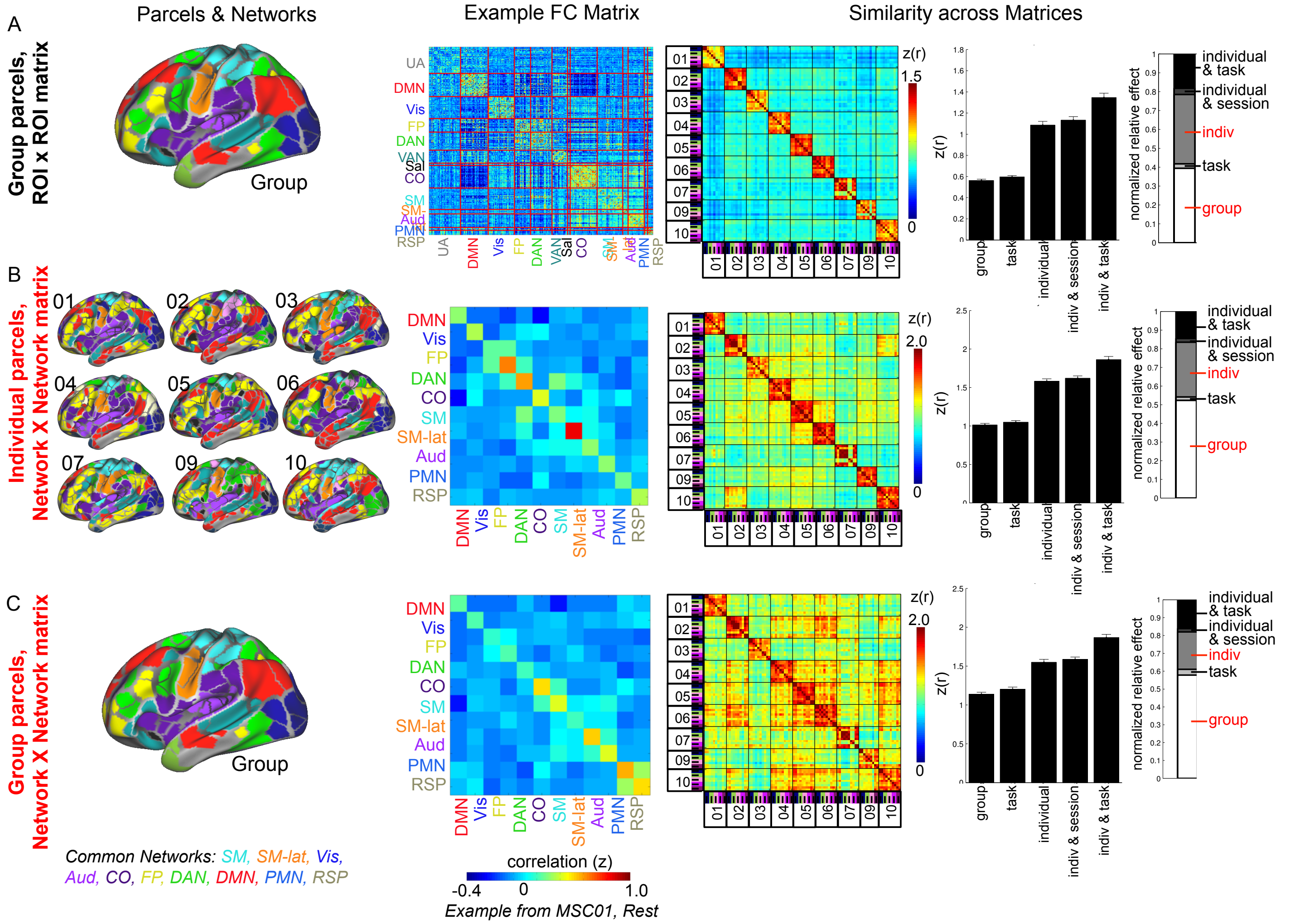


Supp. Fig. 5, Related to Fig. 6: (A-B) Edgewise ANOVA: 10 session version. (A, Left) Full model, variance explained with 10-session version of analysis. (A, Right) Histogram of variance explained for split half (2 session) model (red) and 10 session model (blue). (B) Variance explained (first row), F statistic (second row), and FDR-corrected p-value (third row, blue: $p>0.05$) per edge from the model explaining individual functional connections with factors of subject, task, session, and their interactions. (C) The total variance explained, per edge, by a model including factors of subject, task, session, and their interactions (left, reproduced from **Figure 6A**) and a comparison to a similar model, with mean FD added as an additional factor (right); note the similar levels of variance explained across the two matrices. (D) Difference in variance explained per edge in the two models; differences were very small. (E) Variance explained by the mean FD parameter; no edges were significant after FDR-correction.



Supp. Fig. 6, Related to Fig. 7: (A-C) Similarity of task-rest difference matrices. (A) Similarity of difference matrices (right) compared with original dataset (left – here calculated without the rest condition for best comparison; black = full matrix, red = control systems, blue = processing systems). The normalized relative effect magnitudes are shown to the

right of each plot. Note the relative decrease in group and individual effects, and increase in individual&session and task effects in the difference matrices. (B) Contrast of variance explained by the model with original matrices and task-rest difference matrices. (C) Contrast in variance explained by individual factors in the model. The subject factor decreased substantially in the variance explained. Most other factors were not strongly affected, or increased slightly in the variance that they explained. The subject X session interaction increased strongly.
(D-F) Similarity of activation maps. (D) Similarity per factor of activation maps (right) compared with FC dataset (left– here calculated without the rest condition for comparison; black = full matrix, red = control systems, blue = processing systems). The normalized relative effect magnitudes are shown to the right of each plot. Observe the relative decrease in group and individual effects, and increase in individual&task and cross-subject task effects in the activation maps. *Note the different y-axes for each plot.* (E) Variance explained by the model for task activations. This model explained the majority of variance in most parcels. (F) Variance explained by individual factors in the model for task activations. Subject, task, and subject*task variables explained the majority of the variance, although the subject factor explained substantially less variance than in the functional network model.



Supp. Fig. 7, Related to Fig. 3: Comparison of effects with networks measured using group or individual parcellations. (A) Similarity of networks (at the region of interest, ROI, level) based on group parcels (reproduced from **Figure 3**). Group parcels and networks are shown on the left, an example functional connectivity (FC) matrix (ROI x ROI) is shown in the middle, and the similarity among matrices from different individuals, tasks, and sessions and their quantification is shown on the right. (B) Similarity among networks using individual subject parcellations and network definitions. In this case, the FC matrix is calculated at the network level (i.e., network x network) using individual subject network definitions to allow for alignment across subjects. The similarity across matrices follows a similar pattern to that reported in the manuscript and shown in A, with somewhat larger group effects and smaller individual effects (*note altered y-axis scales*). (C) Similarity among networks using a group parcellation and network definitions. In this case, the FC matrix is calculated at the network level (as in B, producing a network x network matrix) but using group network definitions (as in A). The similarity pattern is very similar to that reported in B, suggesting that the enhanced group effect is driven by the resolution of analysis rather than the group vs. individual region definition.