

reconstructed and are hence the most consistent connections across subjects whereas long-range connections are more prone to error. Also, this method forces a user to choose, somewhat *ad hoc*, the threshold for including a connection in the group-average matrix. Instead, we use an alternative method for generating a group-average connectomes whose edge-length distribution matches that of the typical single-participant distribution (Mišić et al., 2015). Briefly, this method begins by first estimating the average number of connections of a given length in a typical participant’s connectome. Next, all pairs of nodes separated by a comparable distance are identified and, from among this subset, the most consistent connections are added to the group-average connectivity matrix. Repeating this process for all distances yields a representative connectome that matches, almost exactly, the typical edge length distribution, but features only the most consistently expressed edges at each connection length.

5.5. CHUV Group-average matrix with fiber length - See Figures S10-S11

In this report, we test the hypothesis that the human connectome emerges as a consequence of both topological and spatial constraints, which we model as power-law functions. In doing so, we assume that the material/metabolic cost of fiber tracts can be equated to Euclidean distance separating its endpoints, rather than the actual integrated length of the curved tract. The argument for doing so is threefold. First, estimates of fiber length can only be obtained for completed streamlines, meaning that no estimates exist for connections that were absent in the observed tractography data. In order to fill in the missing fiber lengths, one can resort to fiber interpolation (i.e. using the distance/fiber length relationship of existing connections to estimate the fiber length of missing connections), which necessarily introduces an additional source of uncertainty. Second, the relationship of fiber length and Euclidean distance is rather strong across our datasets: the amount of variance in fiber length accounted for by