Supplementary Fig. 1

(a) Example showing the spatial distributions within the arena of behavioral Mode 1 (top) and behavioral Mode 2 (bottom), during a single session (an ‘echolocation+vision’ session). The spatial maps were computed by partitioning the arena into 5×5-cm bins, and dividing the number of times that each mode occurred within a bin by the time the bat spent within that bin; the maps were then smoothed with a 3×3-bin triangular window. Thus, these maps were computed in a manner identical to the computation of the neural place fields, but instead of counting occurrences of spikes we counted here the occurrences of behavioral modes. The spatial location of a mode-occurrence was taken as the bat’s location at the center-time of each 2-s window in which the animal displayed one of these two behavioral modes (the modes were delineated using the behavioral criteria shown in Fig. 4b for the velocity and the call-rate). Linear color scale, from blue (no occurrences) to red (maximal ‘mode-rate,’ equivalent to maximal firing-rate in neural place fields). Maximal mode-rate was 14.3 occurrences/minute for the top map and 13.8 occurrences/minute for the bottom map. Note that although the spatial maps were not entirely uniform, both modes nevertheless covered almost the entire arena – i.e. both modes could occur anywhere in the arena. (b) Main plot: Population histogram of the coherence (Z-transformed) of these spatial maps, computed in the same manner as the coherence of neural place fields (see Methods of the main paper). Blue and red colors correspond to Modes 1 and 2, respectively. Note the low values of the coherence (compare to the histogram of place-field coherence in Fig. 2d) – indicating that the occurrences of the two behavioral modes did not tend to cluster in specific areas of the arena, but were spread throughout the arena. Inset: Population histogram of the spatial-correlation between the two maps (Mode 1 map vs. Mode 2 map) within each session. This histogram shows that in a minority of sessions there was a small negative correlation between the spatial maps of the two modes – but in most sessions the occurrences of the two modes were spatially uncorrelated (correlation ~ 0).