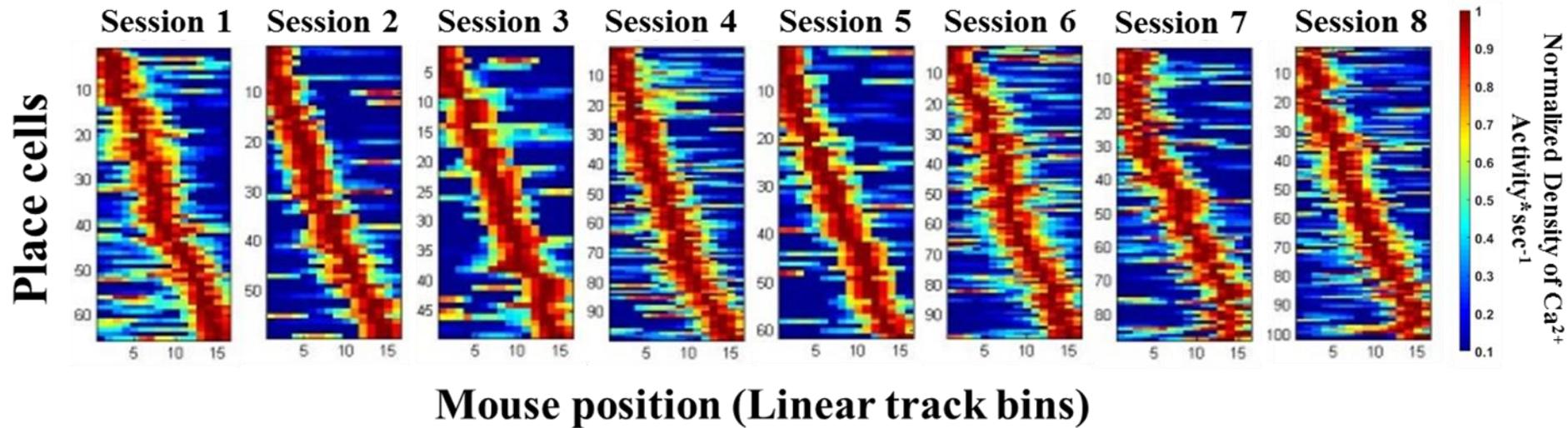


### Supplementary Figure 1. Calcium imaging data processing.

(A) Raw fluorescence image of active GCaMP6f-expressing neurons in CA1 taken from a movie acquired while a mouse was running on the linear track. (B) Spatially down-sampled and  $\Delta F/F$ -transformed image of boxed area in A. Transformation was applied to all frames in the movie. (C) Isolated cell (red circle in B) identified via PCA/ICA processing of  $\Delta F/F$ -transformed movie. (D) Trace illustrating relative fluorescence changes (standard deviations, s.d.) of the identified cell. (E) 1 Hz-filtered trace with asterisks identifying detected calcium events. Scale bars: 100  $\mu\text{m}$ .



**Supplementary Figure 2. Within-day single animal place cell tuning curves.**

Place cells identified by the shuffle analysis sorted with respect to their place field locations on the linear track for that day.