Supporting Figure-1

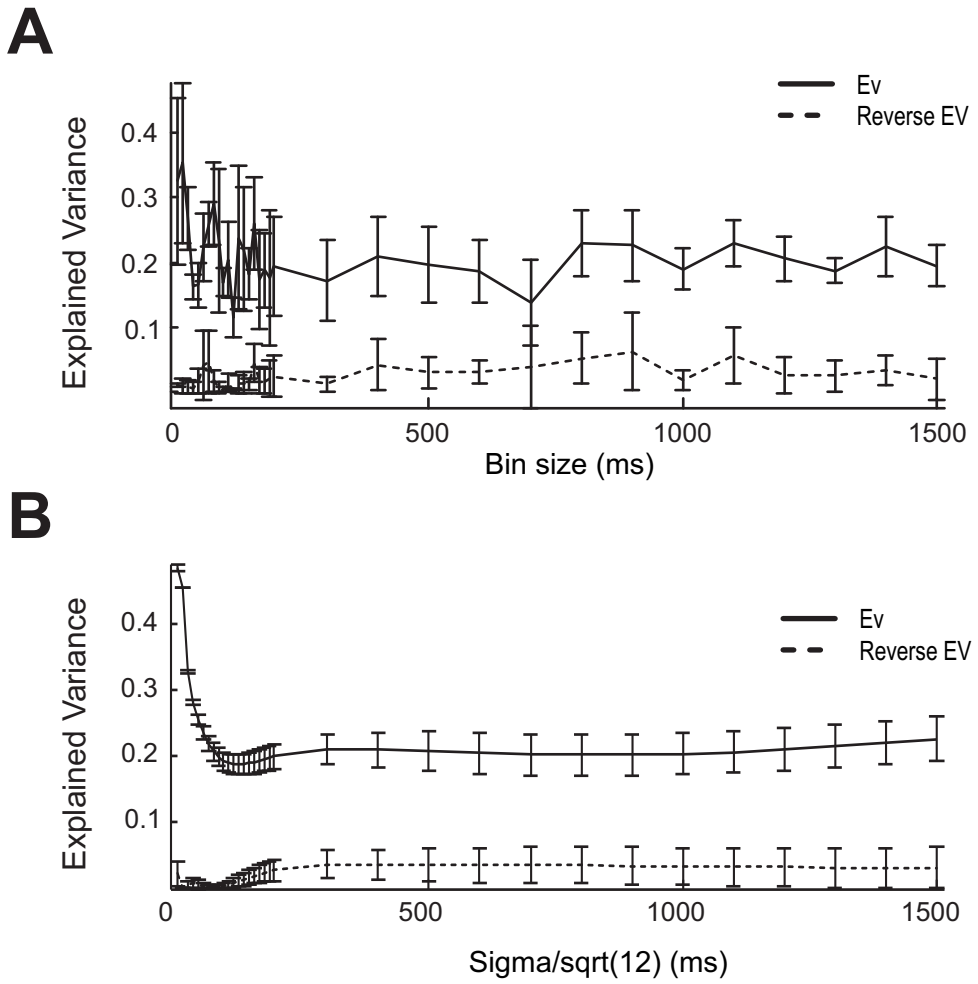

Figure S1. Comparison between the correlation-based explained variance and the smoothed binless similarity-based explained variance used in this study. **A**: correlation based measure as a function of the bin size used for analyses. Note the variability of the measure even at large bin sizes. At a bin size of 100ms, a 10ms increase or decrease of the bin size results in about a 50% change in EV value. **B**: similarity-based explained variance. Sigma is the width of the Gaussian convolution window on which the similarity is based. The division by sqrt(12) allows for the comparison with the correlation-based measure (see Kruscal et al. 2007). At a bin size of 100ms, a 10ms increase or decrease of bin size results in a change of EV values of less than 5%. These curves were computed on the same dataset containing 13 putative dopamine VTA cells recorded simultaneously. Explained variance was computed using the non-spatial rewarded task and 2 flanking sleep sessions (10 minutes each) . Each point is the average +/- s.e.m. of 5 computations, with pre-task sleep shifted by 2 minutes. Reverse EV is obtained by inverting pre and post sleep epochs.

Supporting Figure-2

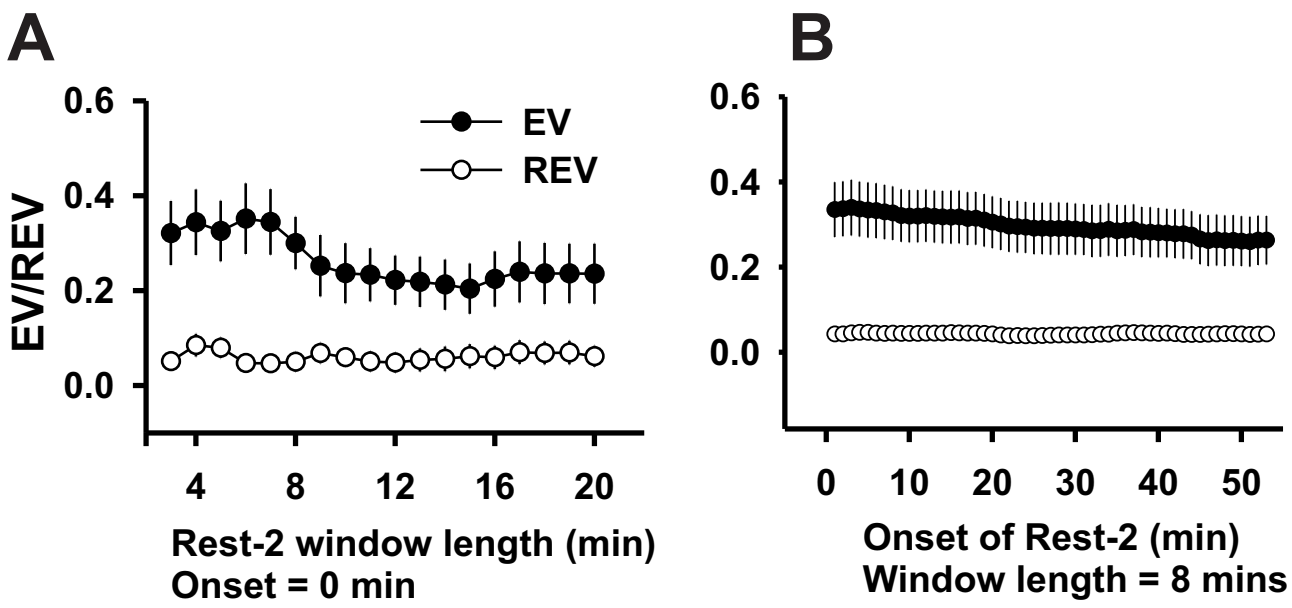

Figure S2. Estimation of the duration and time of onset of Rest-2 needed for the computation of EV and REV. **A:** Variation in the duration of Rest-2 (onset 0 mins), **B:** Variation in the time of onset of Rest-2 analyzed duration 8 minutes). Rest 1 was 8 minutes long immediately before the task started in all cases. EV/REV are best obtained immediately after the task (0 onset) and is the strongest in a 8 minute window). EV and REV values correspond to the average +/- s.e.m. from all sessions from all animals.

Supporting Figure-3

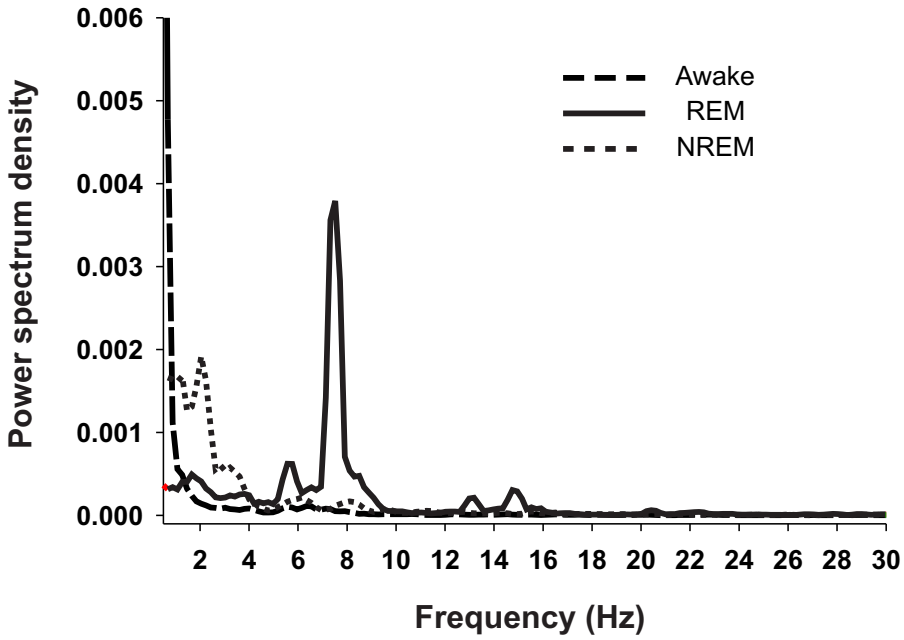

Figure S3: Typical power spectrum density of 3 epochs (15 sec each) corresponding to wake, REM and NREM state.

Supporting Figure-4

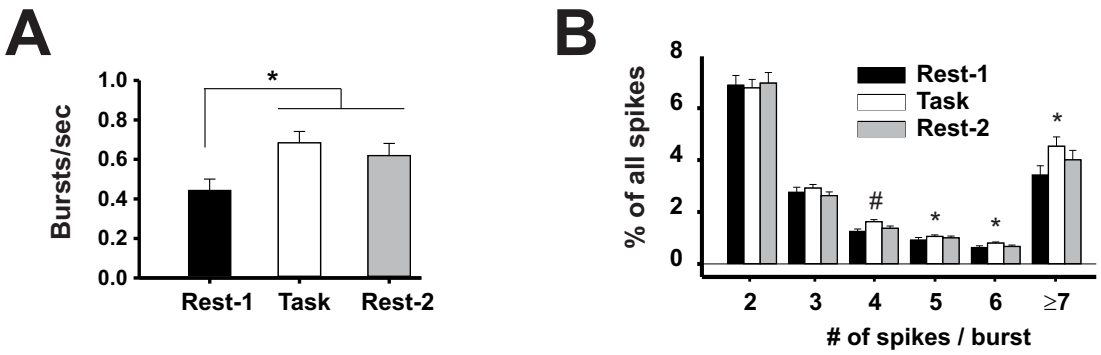

Figure S4: Burst characteristics before, during and after the task. **A:** Average +/- s.e.m. of frequency of burst occurrence. Bursts started when the first ISI was less than 80ms and ended when the ISI was more than 160 ms (Grace and Bunney, 1984). **B:** Average +/- s.e.m. of fraction of bursts containing 2-7 spikes per bursts.* significant with respect to Rest-1, (Kruskal-Wallis One Way Analysis of Variance on Ranks, $p<0.01$ followed by an all pairwise multiple comparison procedures, Tukey Test, $p<0.05$). # = significant respect to Rest-1 and Rest-2, same statistical test as above.

Supporting Figure-5

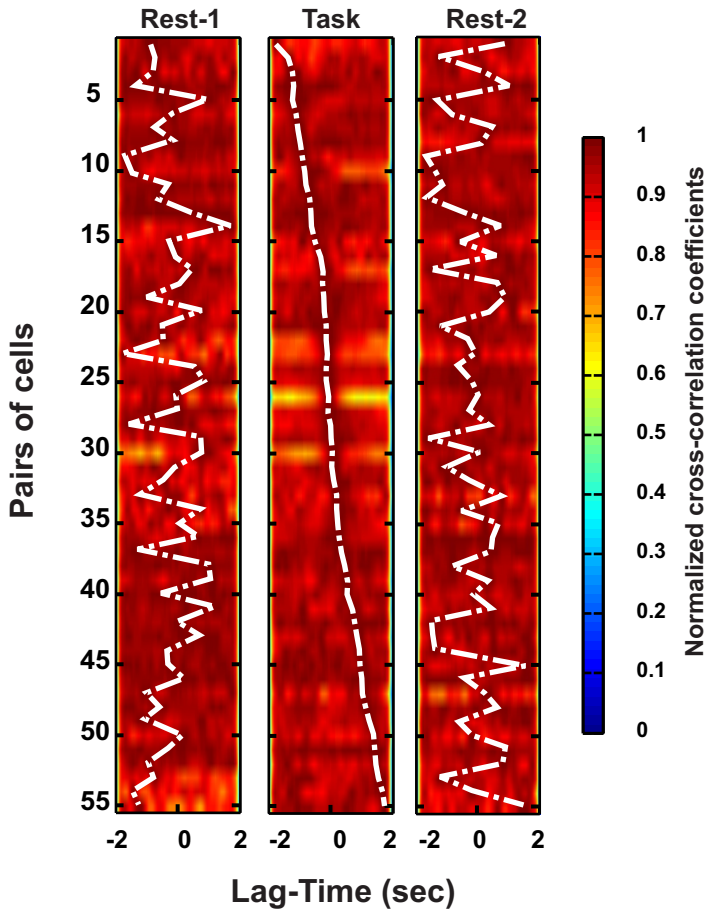

Figure S5. A representative graphical representation of the cross-correlograms of multiple pairs of stimulus non-sensitive neurons showing that the pattern of correlation during the task was not reproduced in Rest-2. Display as in Figure 4.

Supporting Figure-6

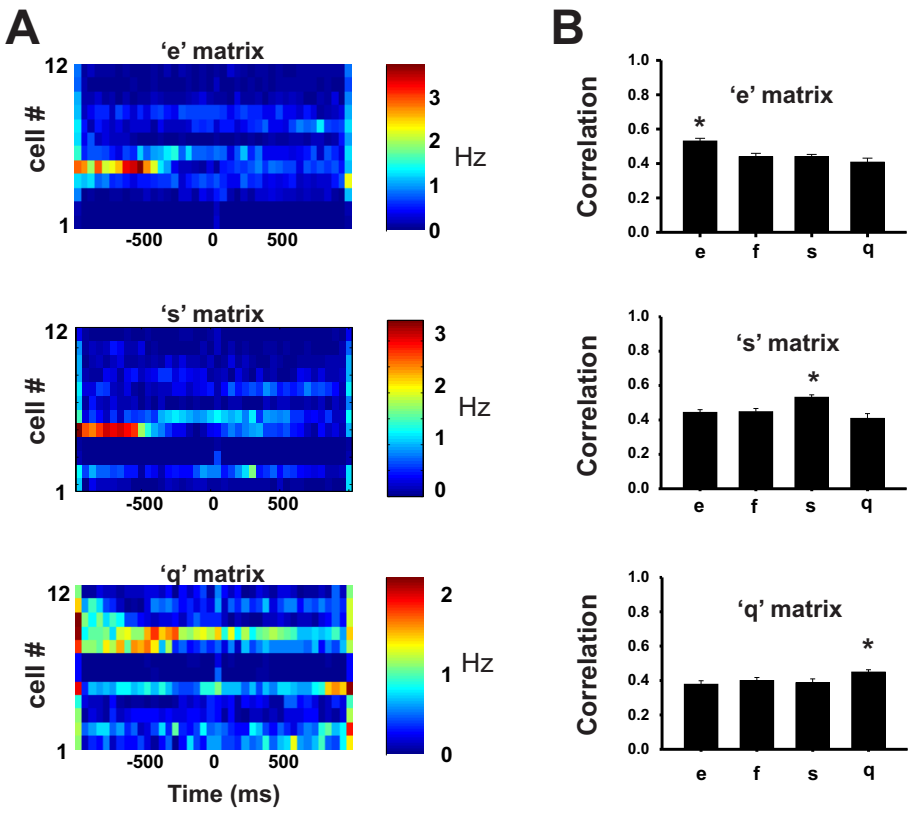

Figure S6: Pattern matching results **A**: Average template matrices for stimuli 'e' (empty tweezers), 's' (sugar pellets) and 'q' (quinine flavored pellets). **B**: Average correlation of each of the matrices at the time of stimulus presentation during the task period (as in Fig 4C). Kruskal-Wallis One Way Analysis of Variance on Ranks (P=0.001, P=0.001, P=0.042) followed by all pair wise Multiple Comparison (Dunn's Method). *=P<0.05, error bar are s.e.m.

Supporting Figure-7

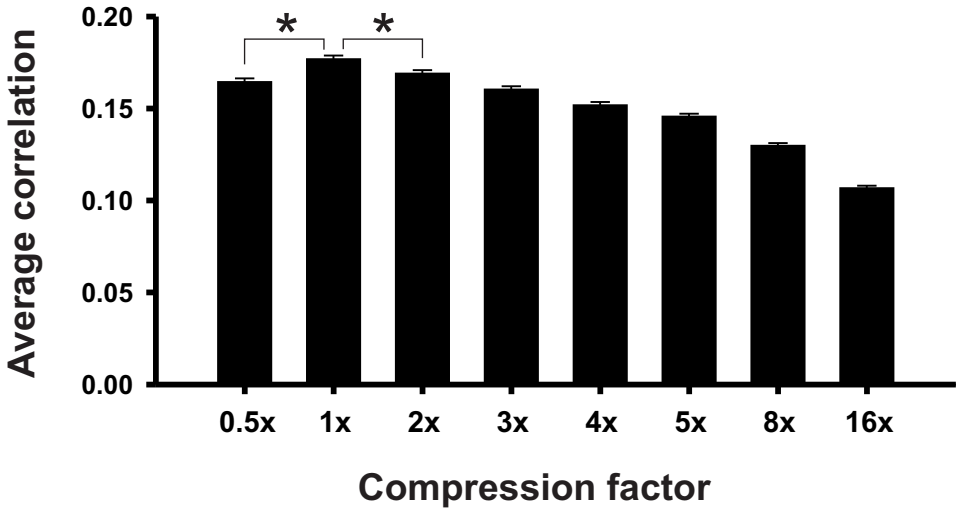

Figure S7: Systematic variation of the temporal compression factor of the templates in Rest-2. Averages are computed across rats and across templates. Kruskal-Wallis One Way Analysis of Variance on Ranks P<0.01 followed by Multiple Comparisons versus Control Group (Dunn's Method) where control was 1X (*=P<0.05).