

Figure 1. Schematic of the radial arm maze. During the forced choice portion, also referred to as the “study phase”, four arms (two small rewards and two large rewards) are pseudorandomly presented one at a time. At the completion of the study phase, the free choice portion begins, also called the “test phase”, where all arms are presented. During the test phase, the animal retrieves the remaining rewards from the arms not presented during the study phase. A well-trained animal will remember which arms presented during the forced choice portion, and will only visit the arms with food. If an animal revisits an arm, it is coded as an “error”. A trial is completed when all rewards have been consumed.

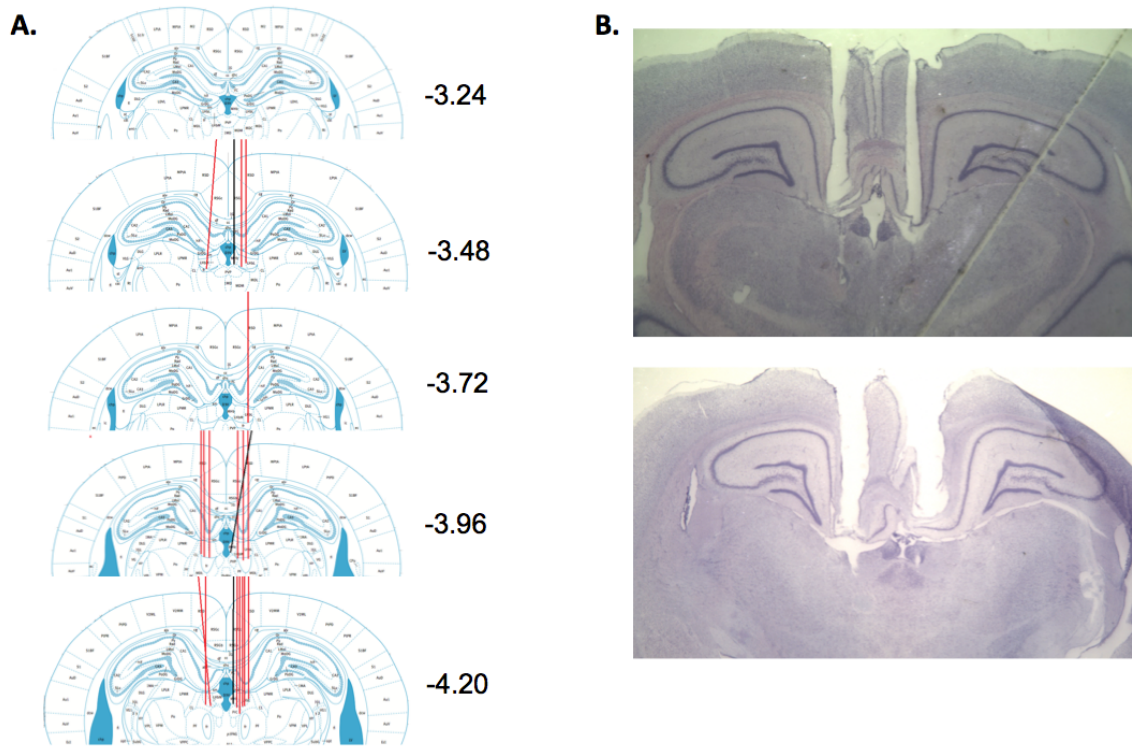
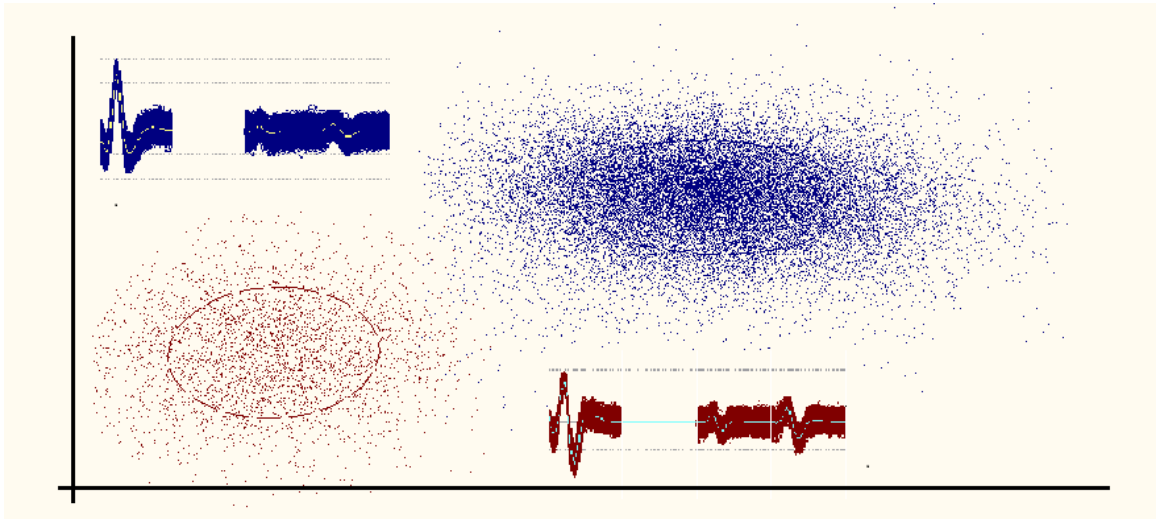


Figure 2. (A) Composite diagram of all implanted animals (AP shown; DV -6.5 mm, top of skull; ML \pm 0.9mm). LHb placement in red, MHb in black. (B) Cresyl violet stained sample slice. Top: LHb; bottom: MHb

A.



B.

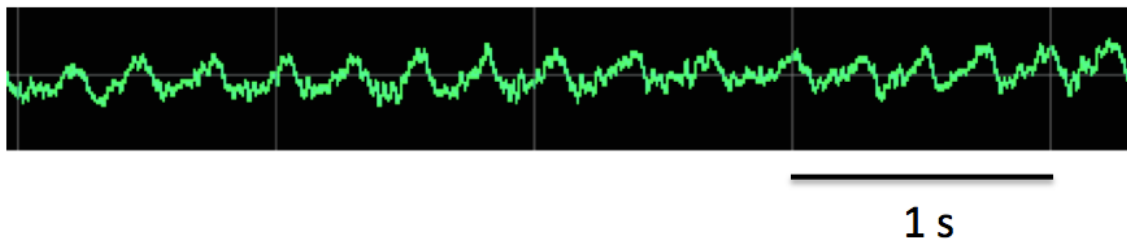


Figure 3. Sample traces from LHB recordings. (A) Signals from two simultaneously recorded LHB cells. Analog traces show signals from each tetraode wire for two cells. (B) Raw LFP data from LHB showing theta rhythm.

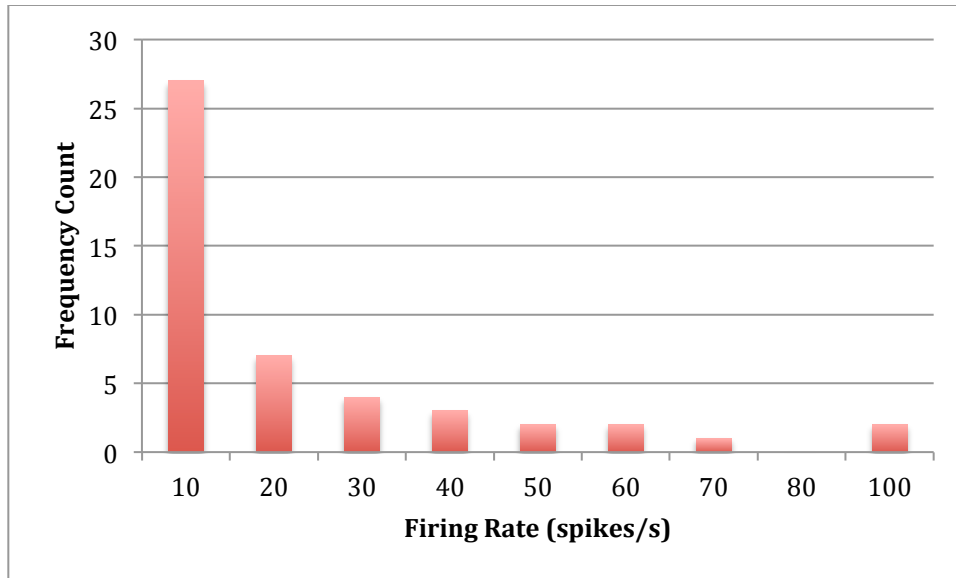


Figure 4. Distribution of mean firing rates in LHB by session. The majority of units had firing rates of 10 spikes/s or less. However, a wide range of firing rates were observed, implying the recordings of multiple cell types.

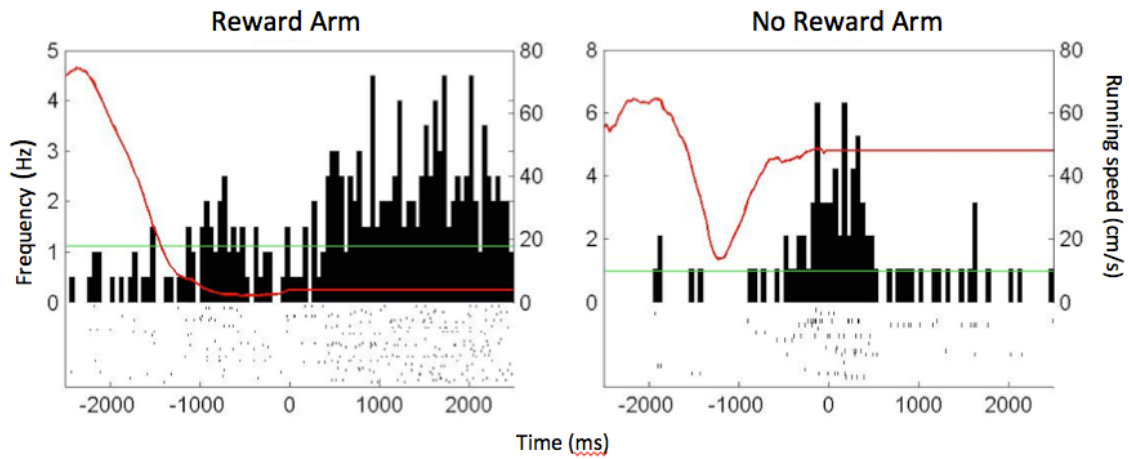


Figure 5. Peri-event time histograms (PETHs) of a reward prediction error neuron (1/36). Left histogram is centered around the time the animal arrived at a rewarded location. Right histogram is centered around the animal arrival at a location where a reward is typically located but was omitted. Inhibition is observed at time of reward encounter. Excitation is seen during reward omissions, where the animal encountered no reward at a location where rewards are expected.

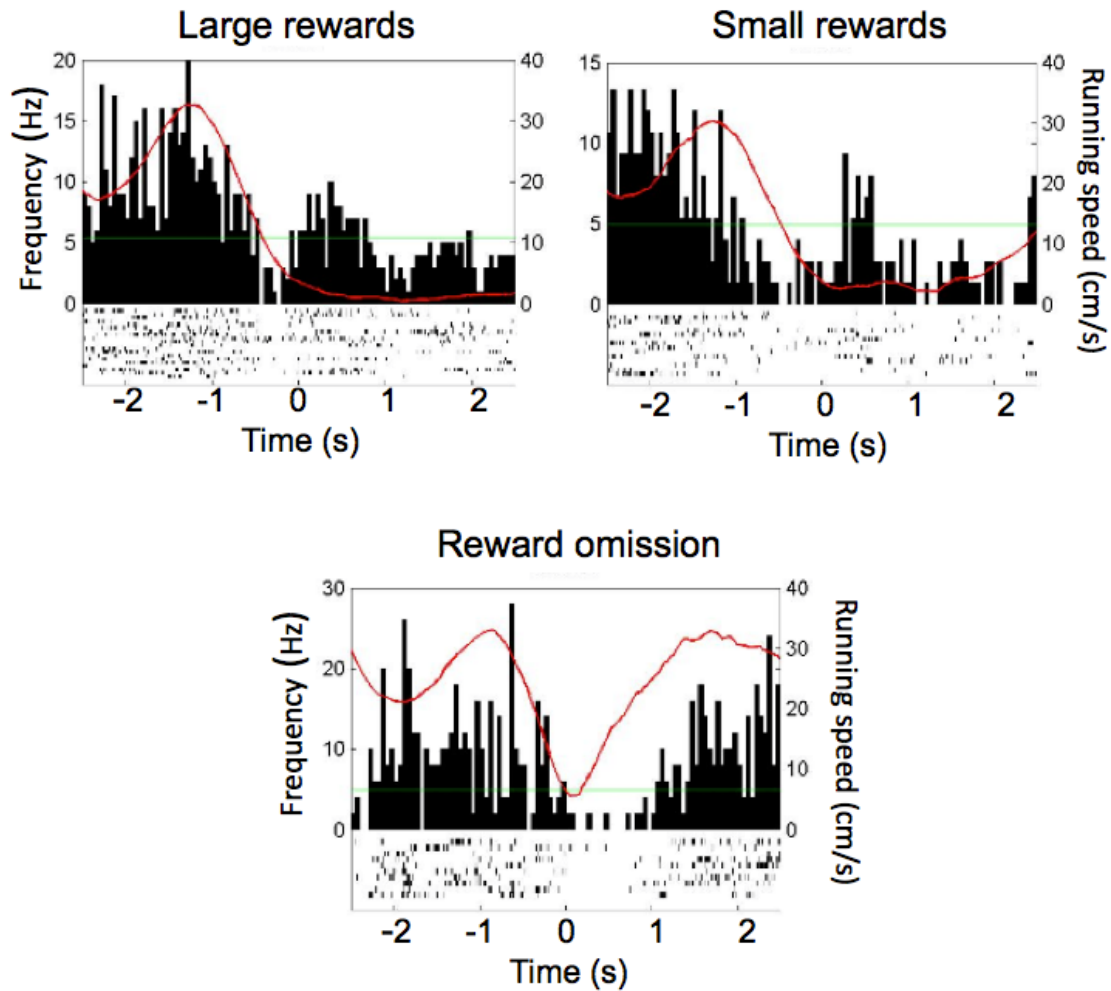


Figure 6. Peri-event time histograms (PETHs) of a cell tracking consumption in conjunction with velocity. (1/36). PETHs are aligned by the event specified in the histogram title. Neuron firing rate scales with animal running speed, shown in red. Additional excitation is seen during reward consumption, when the animal is not moving (time 0 to 1s in large and small reward conditions). This excitation is not observed during reward omission, where firing rate increases only after the animal begins moving again. Green line indicates average firing rate for this session.

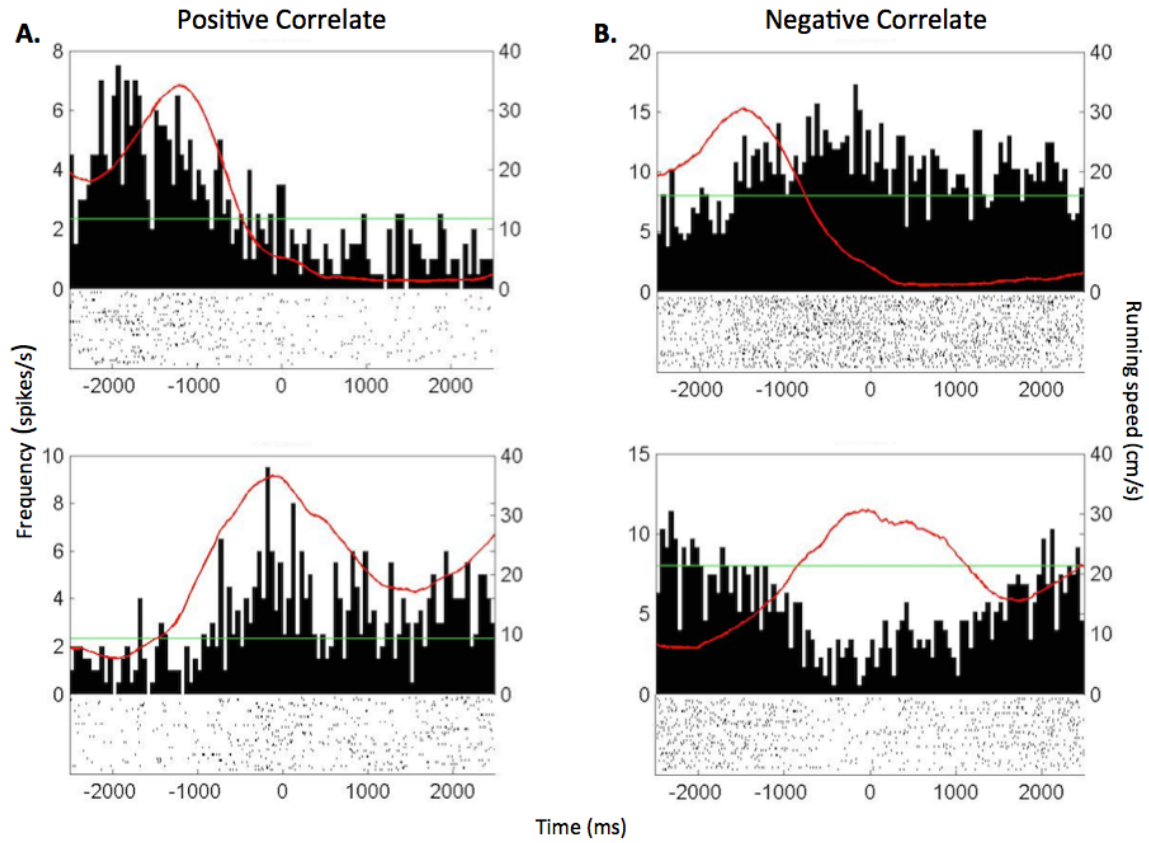


Figure 7. Single unit examples of positive and negative running speed correlates. Left column: positive correlate; right column: negative correlate. Red line indicates animal running speed (cm/s), right axis. Green line indicates average firing rate for that session.

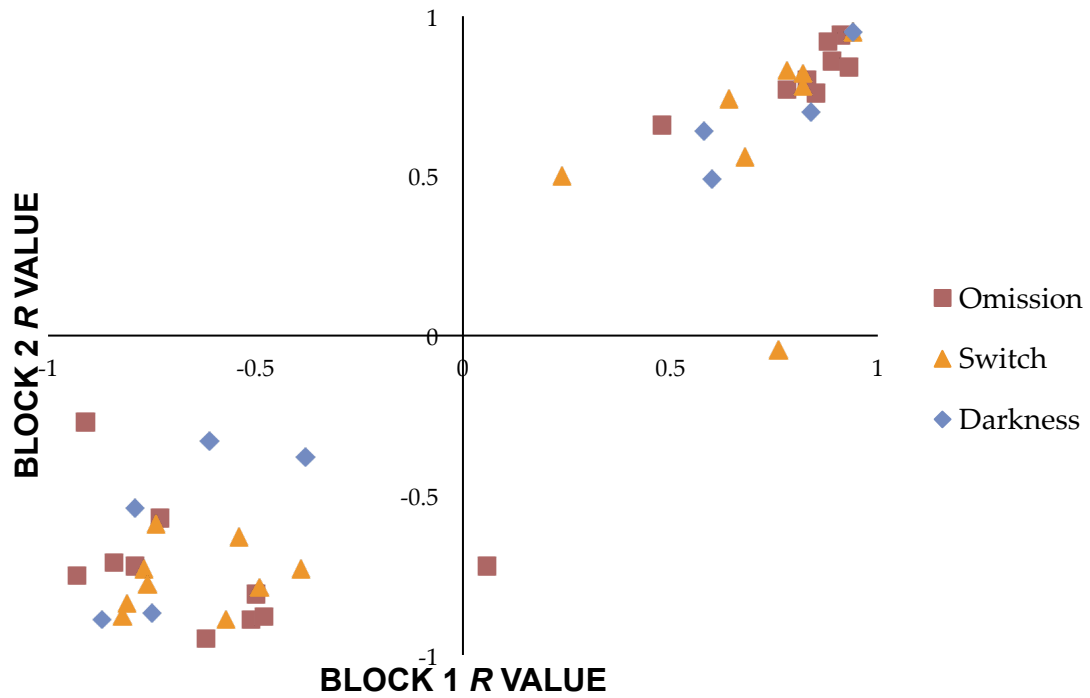


Figure 8. LHb velocity cells are stable across blocks and manipulations. Scatterplot showing R values for sessions significantly correlated with running speed. Colors/shapes of data points indicate experimental manipulation conducted during block 2.

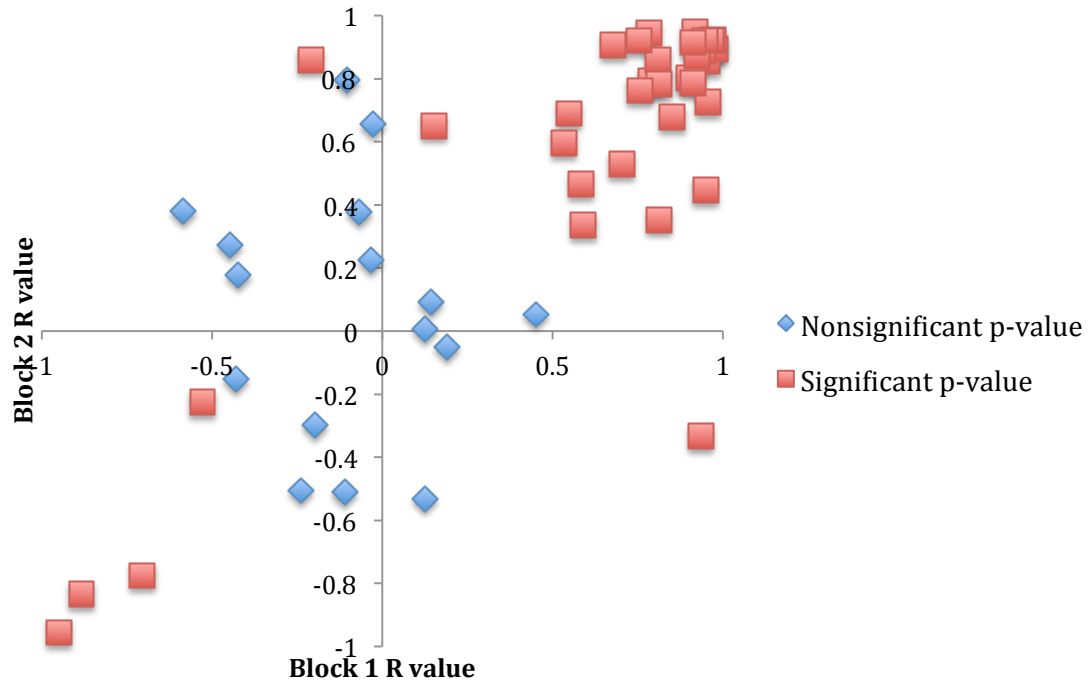


Figure 9. Theta power and velocity correlations are stable across blocks. Scatterplot showing r values for all sessions. Colors/shapes indicate whether the correlation for that session over all was found to be statistically significant.