Supplementary Information Guide

Figure S1: (page 1)

Schematic Diagram of Reverse Replay

(a) While a rat runs along a linear track, hippocampal neurons are active in a place-specific manner. In this example, the preferred places of five different hippocampal place cells are shown as elipses on the track. As the rat runs through successive locations on the track, place cells associated with these locations become active, as indicated by the red shading.

(b) When a rat stops at the end of a linear track after running down it, the sequence of cell activity experienced during running is replayed in reverse order.

Figures S2-S5: (pages 2-9)

Reverse Replay Events from Four Recording Sessions in Four Animals

Each figure shows significantly reverse ordered events that occurred during the recording session, in one direction only, arranged by lap. Each event is shown as a set of spikes within a square box figure, with cells on the y axis, and time on the x axis. For each session, a key in the top right corner gives the time in seconds, and the number of cells, which are the same for all the events shown from that session. Events longer than 400ms in duration are not shown.

S2   Rat 1, novel track (pages 2-5).

S3   Rat 2, novel track (pages 6-7).

S4   Rat 3, familiar track (page 8).

S5   Rat 4, familiar track (page 9).

Figures S6: (page 10)

Model of Reverse Replay Generation

Text included in figure.

Figures S7: (page 11)

Function of Reverse Replay

(a) A simple model of how reverse replay might be paired with a reward signal to

   learn a representation of value.

(b) A schematic representation of how value information can guide behavior during

   running.