Supplementary Results

Anatomical

Twelve rats had very large lesions to over 80% of the hippocampus, including extensive damage to all the subfields (CA1-CA3, dentate gyrus). Ten rats had lesions that affected 60-80% of the hippocampus and 5, 50-60%. In all cases, extra-hippocampal damage was minor or non-existent. The pattern of hippocampal damage in rats in the various experimental conditions was similar.

Correlational analyses were performed on the number of errors made by rats with hippocampal lesions in the RT, TO, and PO conditions and the amount of tissue destruction in each rat. These analyses yielded non-significant correlations in each case (RT: $r = 0.50$; TO: $r = 0.41$; PO: $r = 0.29$; all $P$’s $> 0.05$). We also divided the lesioned rats into groups of large (> 80% of hippocampus destroyed), medium (60-80% destroyed), and small (50-60% destroyed) for each condition, and examined their corresponding number of errors. Here, again, there was no relationship between lesion size and performance. Of particular interest, the average number of errors in the large and small lesion groups over the three conditions was virtually identical, 163 for the large-lesion group and 156 for the small-lesion group. The number of rats in the subsequent experiments was too small for correlational analysis to be meaningful but, here too, it was clear from examination that size of lesion was unrelated to performance in all conditions.

RT Subgroups

The performance of the RT subgroups during pre-operative training was essentially the same as that of the larger RT groups from which they were derived, and that of the PO control group (see Fig. 1b).
Pre-operative Training

The subgroups of 4 hippocampal and 4 control rats from the RT condition that were tested post-operatively in all the conditions had the following average number of errors during the first 5 days of pre-operative training: Hippocampal – 5.7, 7.2, 4.0, 5.0, 3.0; Control – 6.7, 7.7, 5.0, 3.8, 1.3. When these scores are compared to the rats’ performance in the room change (Fig. 3a) and village rotation (Fig. 3c) tests, where both groups were impaired, it is clear that only the control groups showed savings relative to their pre-operative training performance. Thus, it would appear that the superior performance of the control rats can be attributed to a combination of savings from pre-operative training and preserved ability to learn new spatial relationships. As demonstrated in the other tests, rats with hippocampal lesions showed excellent memory for the pre-operatively learned environment (Fig. 1a, Fig. 3b,c,e). Their poor performance in the room change and village rotation conditions is related primarily to a deficit in learning new allocentric spatial relationships.

Village Rotation Results

Over the first 5 days in the village rotation test, the hippocampal group first visited the reward compartment’s original location on 65 % of the trials, a response that was significantly above chance, $P < 0.03$. Clearly, in this test, response selection by hippocampal rats was strongly influenced by their memory of the original reward location. By comparison, beyond Day 1, the control group was more likely to go to the new location, even on the first selection of each trial. Over Days 1 to 5, they initially went to the original location on only 35 % of the trials. Interestingly, on Day 1, Trial 1, three of the four rats in each group responded first to the compartment that was now situated in the original location of the reward compartment, with respect to distal (room) cues.
Effect Sizes

On critical tests (e.g., room change, village rotation, radial arm maze), significant group differences were obtained with relatively large effect sizes ($\eta^2$ between .26 and .81). In those experiments where no group differences were found, effect sizes were much smaller ($\eta^2$ between 0.001 and 0.03). Overall, this pattern of effect sizes points to reproducible results (with larger samples) that are consistent with our theoretical approach.
Fig. 1

**Floor rotation**

![Graph showing number of errors over days for HPC and Control groups.](image)

**Anosmia**

![Graph showing number of errors over days for HPC ZS, Control ZS, HPC S, and Control S groups.](image)

Fig. 2

**Radial arm maze**

![Graph showing number of errors over days for HPC and Control groups.](image)
Figure 1. Results for RT groups in the floor rotation (a) and anosmia (b) tests. In Panel b, ZS denotes zinc sulfate and S denotes saline treatments.

Figure 2. Results for RT groups in the radial arm maze test.