## Full Vector Ants


C. $180^{\circ}$ Rotation

B. $90^{\circ}$ Rotation

D. $270^{\circ}$ Rotation


$$
\begin{aligned}
= & \text { Exit Indicated by Skyline } \\
= & \text { Trained Exit Direction Indicated by } \\
& \text { Celestial Local Vector } \\
= & \text { Nest Direction }
\end{aligned}
$$

Fig. S1. Full-vector ant directional bearings for each test in Experiment 1. Grey circles indicate ants' directional bearings after crossing a marked goniometer line 30 cm from a central release location. Open triangular markers indicate the nest direction. Black diamond markers indicates the trained exit direction of the arena according to a learned route (celestial local vector). Closed triangular markers indicate the exit direction according to ants' view-based navigational system (terrestrial panorama). Headers above each circular plot indicate the degree the testing arena was rotated relative to the orientation of the training arena. The $95 \%$ confidence interval of the mean is displayed as a curved marker on the inside of the circular plot.

Table S1. Mean heading direction and scatter of full-vector ants in each arena

| Arena rotation | Mean heading direction | Circular SD (scatter) |
| :---: | :---: | :---: |
| 0 deg | 308.76 deg |  |
| 90 deg | 311.61 deg | 0.15 |
| 180 deg | 307.29 deg | 0.16 |
| 270 deg | 299.60 deg | 0.13 |
|  |  | 0.15 |

