Supplementary information

Channel to unfamiliar location

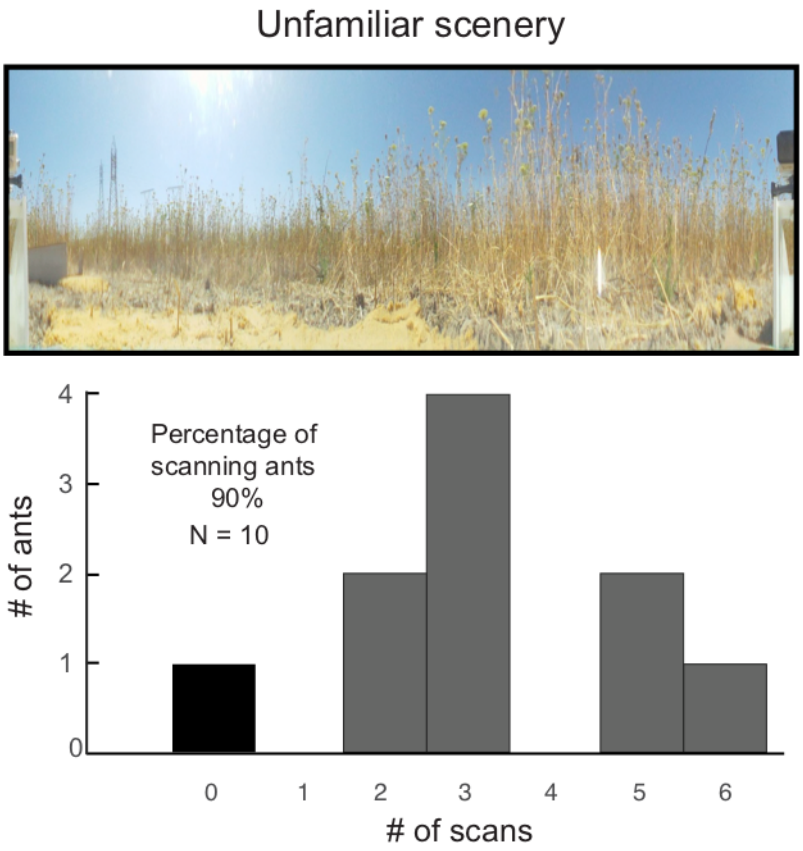


Fig. S1. Scanning behaviour of ants tested in an unfamiliar environment. Zero-vector ants (caught just before entering the nest and hence without vector information) were transferred to the test channel but released in an unfamiliar environment: the upper panoramic image shows clear differences to the training environment (see figure 1c). Test area size and recording procedure was identical as in Experiment 1. The results show that with the exception of one ant, all other ants displayed one or more scans after leaving the test channel. As expected the unfamiliar view triggered in most ants numerous scans.

Familiarity Control

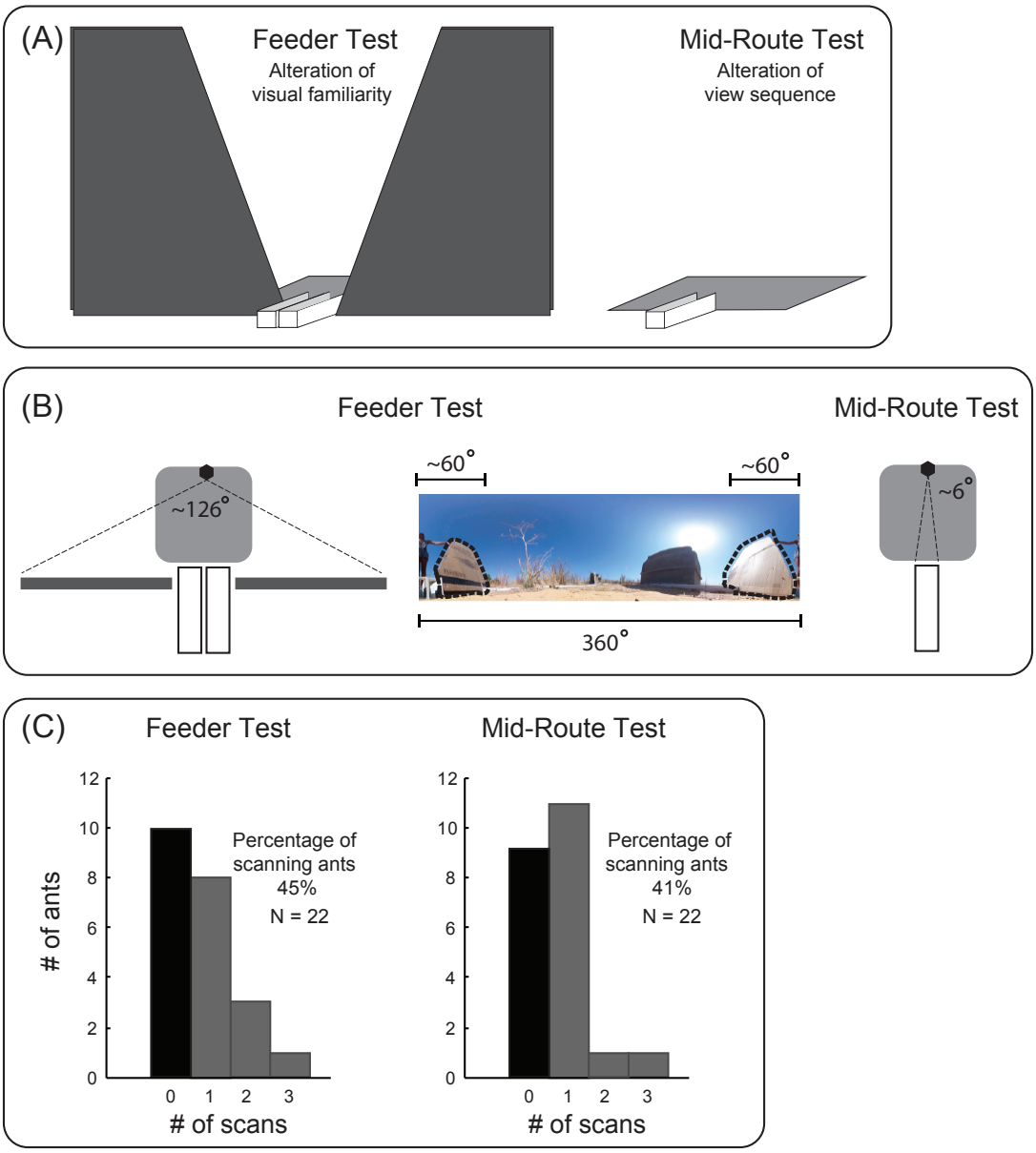
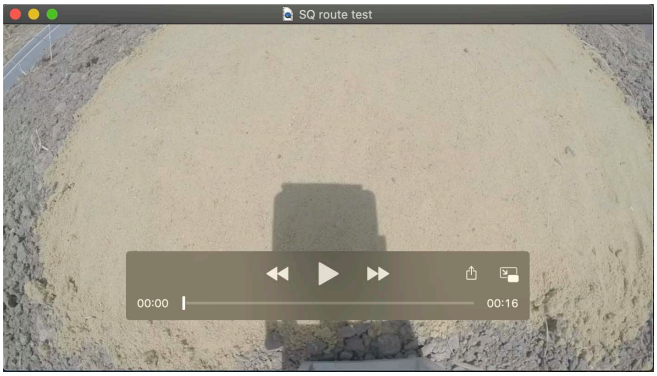


Fig. S2. Familiarity Control with altered visual surroundings during Feeder Test. (A) Ants were trained as in Experiment 2 and tested each at the feeder with altered visual surroundings and at the route with an altered sequence of views. During tests, two large (~0.6 × 0.8 m) brown cardboard walls were erected perpendicular of the test channel altering the visual surroundings. (B) Level of visual familiarity during Feeder- and Mid-Route Test. Top-view of experimental set-up with erected walls at the Feeder Test covering ~126° of the visual field of the tested ant at the end of the test area (black hexagon). Panoramic image with emphasised erected walls illustrates the visual alteration at the Feeder Test. At the Mid-Route Test only ~6° of the visual field is covered by the test channel. (C) If the altered familiarity at the feeder provokes less scans at the feeder than the altered sequence of views at the route, the scan-increase during Experiment 1 and 2 is caused by the altered sequences of views and not by the drop of familiarity at the channel exit. However, no difference in the number of scans could be determined (GLM: Chi = 0.031, p = 0.861) as the general linear mixed model with Poisson distribution error and ant identity as random effect confirms. Consequently, it cannot

be excluded that the potential drop of familiarity at the Mid-Route Test in Experiment 1 and 2 caused the scan increase and not the altered sequence of views. However, the visual alteration of the Familiarity Control lasted much longer than the short (max. 0.5-1.0 sec) drop of familiarity at the Mid-Route test and hence had probably more effect on the homing ants. Also, a calculation of the visual alteration at the end of the test area (50 cm after channel exit) confirmed that the triangles during Feeder Test still covered ~126° of the visual field whereas the channel exit during Mid-Route Test covered only ~6°. Thus, the increase of scans at the Feeder Test may not be surprising and might outweigh the effect of the sequence alteration of the route test.

Movie 1. **Feeder Test.** Examples of scanning behaviours of ants at the Feeder Test with an unaltered sequence of views.



Movie 2. **Mid-Route Test**. Examples of scanning behaviour of ants at the Mid-Route Test with an altered sequence of views.

Movie 3. **Unfamiliar Test**. Examples of scanning behaviour of tested ants at an unfamiliar location.

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