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Ant navigation: resetting the path integrator

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Desert ants use path integration as their predominant system of long-distance navigation, but they also make use of route-defining and nest-defining visual landmarks. Such landmark-gained information might override the information provided by the path integrator, but nevertheless the path integrator keeps running. Here we show that only cues that are associated with the ant being inside the nest are able to reset the path integrator to zero state. Ants were captured at a feeder, i.e. without having run off their home vector, and were forced to enter the nest. On their next outbound run their walking direction differed by 180° from that of ants that had also been captured at the feeder but instead of having been forced to enter the interior of the nest were released at its entrance. Whereas these latter ants still ran off their home vector pointing in the feeder-nest direction (and by this departed from the nest in a direction opposite to the feeder direction) the former ants had reset their home vector to zero state, and had therefore been able to reload their learned feeder vector, and consequently departed from the nest in the feeder direction.

Owing to its egocentric nature the path-integrator is error prone. Hence, it is a suitable strategy to reset the path integrator if the ant has appeared at its final goal, the nest. Otherwise during consecutive foraging runs navigational errors would steadily increase.

Key words: path integration, orientation, *Cataglyphis fortis*

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