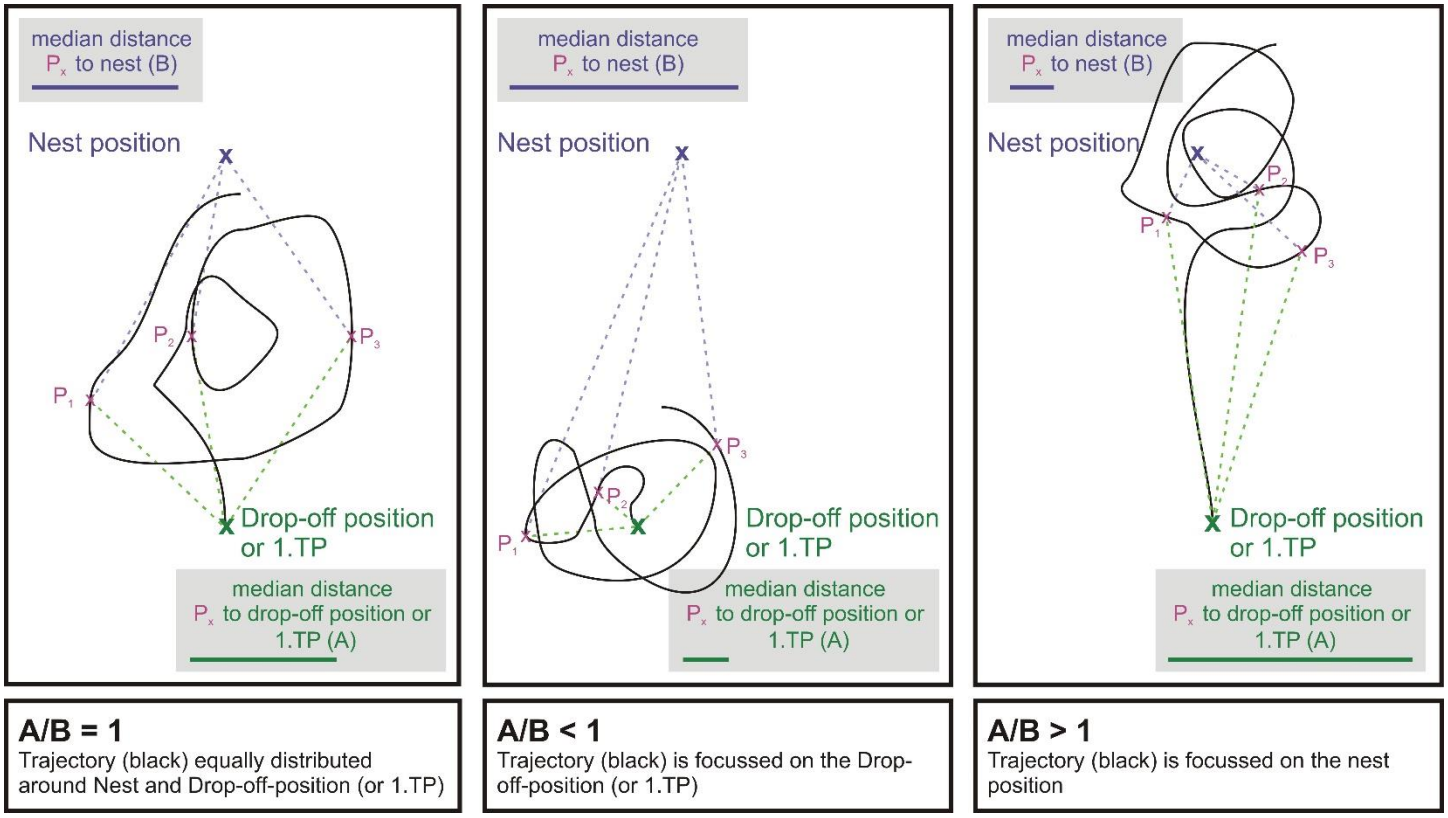

Fig. S1. Illustrative explanation for the search-focus-index (A/B).

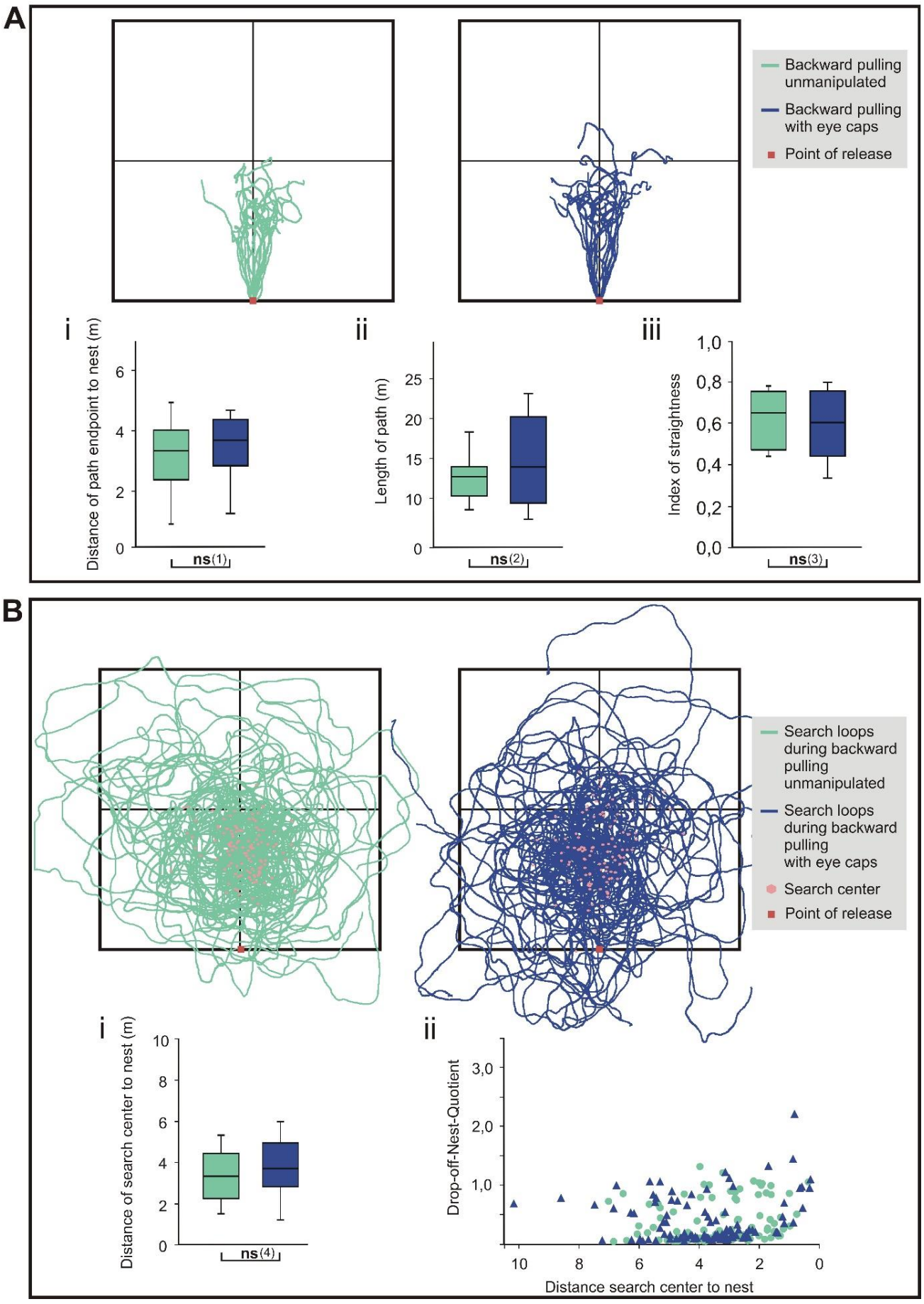

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Fig. S2. Comparison of backward homing performance with and without ventrally occluded eye halves.

A Backward dragging path *without* eye caps (n=20) on the left side and *with* eye caps (n=20) on the right side. Corresponding analysis (i-iii) are shown in the lower part of this panel. We plotted a 20 m x 20 m field side, the releasing point is marked by the red square, and the intersection of the black lines in the middle of every plot marks the hypothetical nest site. Box plots give the 10, 25, 50, 75, and 90 percentile distribution.

B Foodless search loops *without* eye caps on the left side and *with* eye caps on the right side. The search loops were restricted to 5 minutes of recording (see material and methods). Corresponding analysis (i-ii) are shown in the lower part of this panel. Box plots give the 10, 25, 50, 75, and 90 percentile distribution. The search-focus-indices for the group *without eye caps* and those for the group *with eye caps* do not differ significantly from each other (t-test for regression coefficient, $p>0.05$).

Statistical analysis: (1) t-test, $p=0.380$; (2) U-test, $p=0.490$; (3) t-test, $p=0.666$; (4) U-test; $p=0.090$;

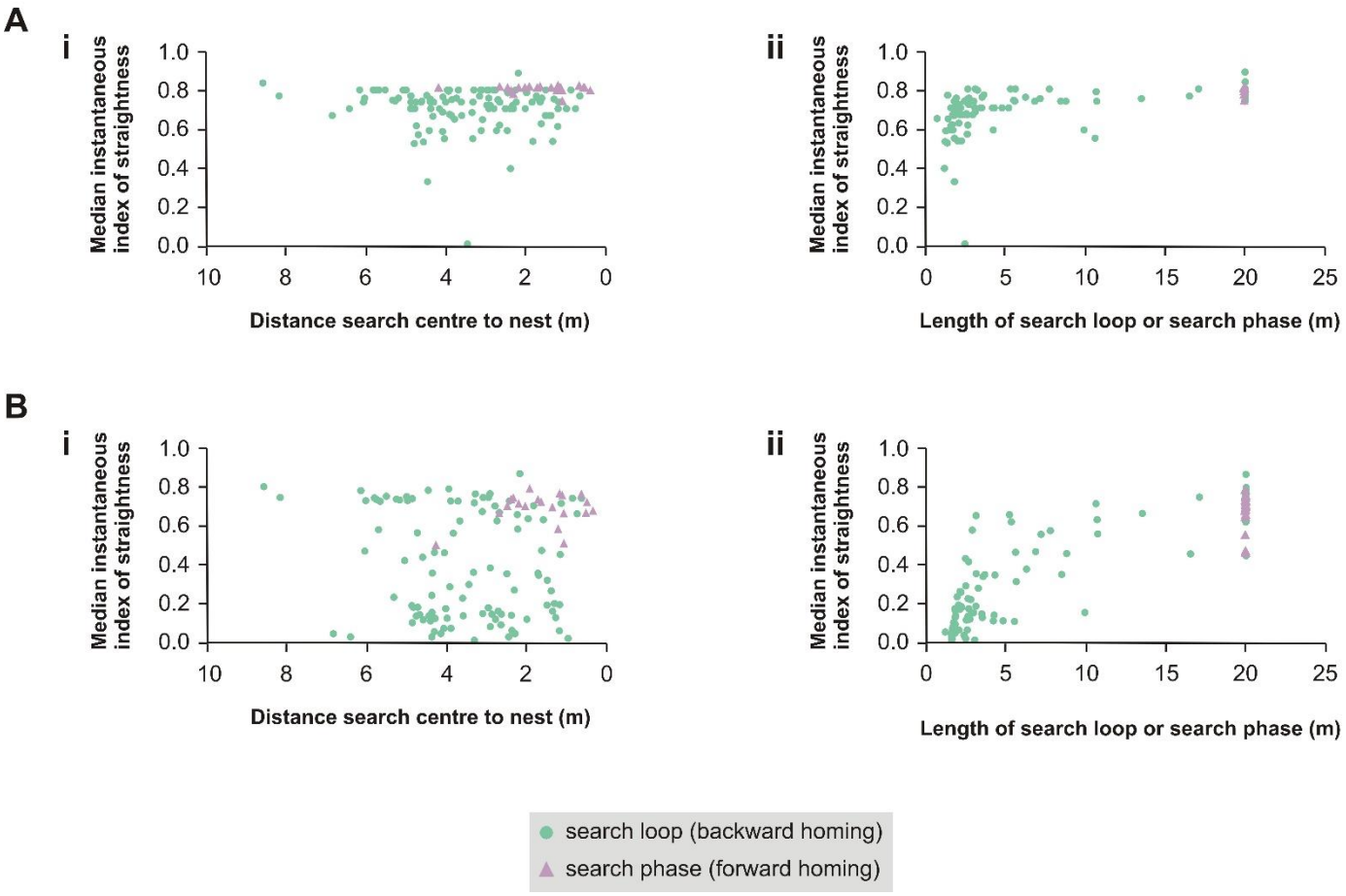

Fig. S3. Instantaneous index of straightness.

With the instantaneous index of straightness (IIS) we analysed different path sections (bin = 10 data points, A; bin = 50 data points, B) according to the current value of the index of straightness. The IIS-index is calculated as the quotient of the straight line distance and the actual length of the path section for each bin. The median IIS-value gives a measure for the smoothness of a trajectory. Here we use the '*instantaneous* index of straightness' and not the 'index of straightness' (as in Fig 4 A iii) because a search loops starts and ends at the same point, namely the position of the dropped food item. Therefore the dividend (straight line distance) would have a value of zero and the same would be true for the resulting value of the index of straightness.

A Instantaneous index of straightness was calculated for a bin of 10 data points (0,37 m ± 0,02 m); median IIS-values are shown with respect to (i) the nest distance (search centre of respective trajectory) and (ii) the length (of respective search trajectory).

B Instantaneous index of straightness was calculated for a bin of 50 data points (1,85 m ± 0,11 m); median IIS-values are shown with respect to (i) the nest distance (search centre of respective trajectory) and (ii) the length (of respective search trajectory).

Note the different tendencies that results from the plot above:

(i) The IIS-values show a higher spread with an increasing length of the bin size (compare Fig S3 A i, ii (10 data points) and B i, ii (50 data points)).

(ii) The IIS-values of the search loops show no significant correlation with respect to nest distance (compare Fig S3 A i and B i; both Pearson's correlations $p > 0,05$).

(iii) The IIS-values tend to be lower in shorter trajectories than in longer ones (compare Fig S3 A ii and B ii).