**Supplementary material**

(1) **Video analysis**

The analysis of crab responses followed the procedures developed by Hemmi [1-2]. Crab positions were tracked at 200 ms intervals using a video analysis program written in C and MATLAB [Jan Hemmi, The Australian National University, see 3]. A home-run response was considered to have started in a given frame when a crab had moved at least 0.66 cm towards its burrow since the previous frame and at least 2 cm during a three-frame interval (600 ms) including that frame. For the analysis of timing, we assumed that the crabs made their escape decision one frame (200 ms) before the response-criterion was reached.

For the analysis of bird movements, the above procedure was slightly changed. Videos were digitised at half-frame precision (every 20 ms). The position of all approaching flying animals was then tracked through all frames and their elevation, horizontal and vertical angular speed calculated from calibrated digitised paths. No attempt was made in the calculation of elevation to correct for the difference in height between crab eyes (about 2-3 cm) and cameras (13 cm). Even for a close bird at 10 metres distance, this results in a maximum error of 0.75° in elevation. For closer animals, like flies and dragonflies, the error might be significantly larger. However, the geometry of these close approaches means that crabs are likely to see these insects from a completely different vantage point and the information we can deduce, especially about retinal elevation and the actual background against which these animals were seen, is limited in such cases.

To define the signal at the level of a single photoreceptor, we calculated the average pixel value in a window of 3x3 pixels around the centre of a bird’s image. In many cases, this window covered the full image of the bird. For the analysis of response criteria, we then calculated flicker (temporal local contrast change) at any given time as the difference between the minimum and maximum signal that had occurred at the bird’s current position during the preceding 200 ms. The bird’s speed, contrast and change in contrast (produced mainly by its wing beats and orientation relative to the sun) are the most important characteristics determining the level of this flicker parameter.

(2) **Selection of trials**

Bird activity and approach directions are difficult to predict. We only analysed those ‘predator’ approaches that were completely recorded on the bird cameras and discarded all approaches that coincided with movement of a bird outside the field of view of the cameras. Similarly, when two or more simultaneous approaches were recorded on camera, we discarded all of them unless one approach was clearly more salient (as judged by apparent

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1 This window size is equivalent to about 0.6°x0.6° apparent size from a crab's perspective and is thus smaller than the smallest acceptance angles of fiddler crab eyes [4]. However, the crabs’ contrast sensitivity and dynamic range are likely to be far superior to those of the video cameras used in this study.
size, speed and contrast) than all simultaneous events. Whenever this was the case, we scored responses to the most salient event and non-responses to all others for the statistical analysis (see below).

In their natural environment, crabs typically do not only respond to birds, but also to one another [5] and to other events outside our control. To minimize the contribution of such responses, the following criteria were used for inclusion of sequences in the final analysis: (i) there was no crab-crab interaction; (ii) crabs were at least 5 cm away from their burrow; (iii) crabs had to be within the recording area at the start of their response; (iv) after a response, a crab was excluded from the analysis for the following three seconds. The last criterion was used to ensure that (almost) continuous home-runs were not erroneously scored more than once. We limited this 'time-out' to three seconds as this gave crabs sufficient time to fully execute their response and to start moving away from the burrow again. A total of 152 home-runs and 14 underground responses met these criteria and were included in the final analysis.

References