

Fig. S1. Experimental setup for testing adults. Groups of flies were tested in large plastic arenas containing two identical food patches (grey discs). Patches were made of 2 mL of artificial diet set in 55 mm Petri dishes. Before being tested, groups were food-deprived in a small plastic vial for 12 h. Each group was released at equal distance from the two food patches by opening the plastic vial. A webcam was positioned above each patch. Webcams were connected to a laptop computer and programmed to record images of food patches every minute for 1 h. The number of flies on each image was counted automatically using an image analysis software (see detailed procedure in Fig. S3). Drawing by Pierre Vedel.

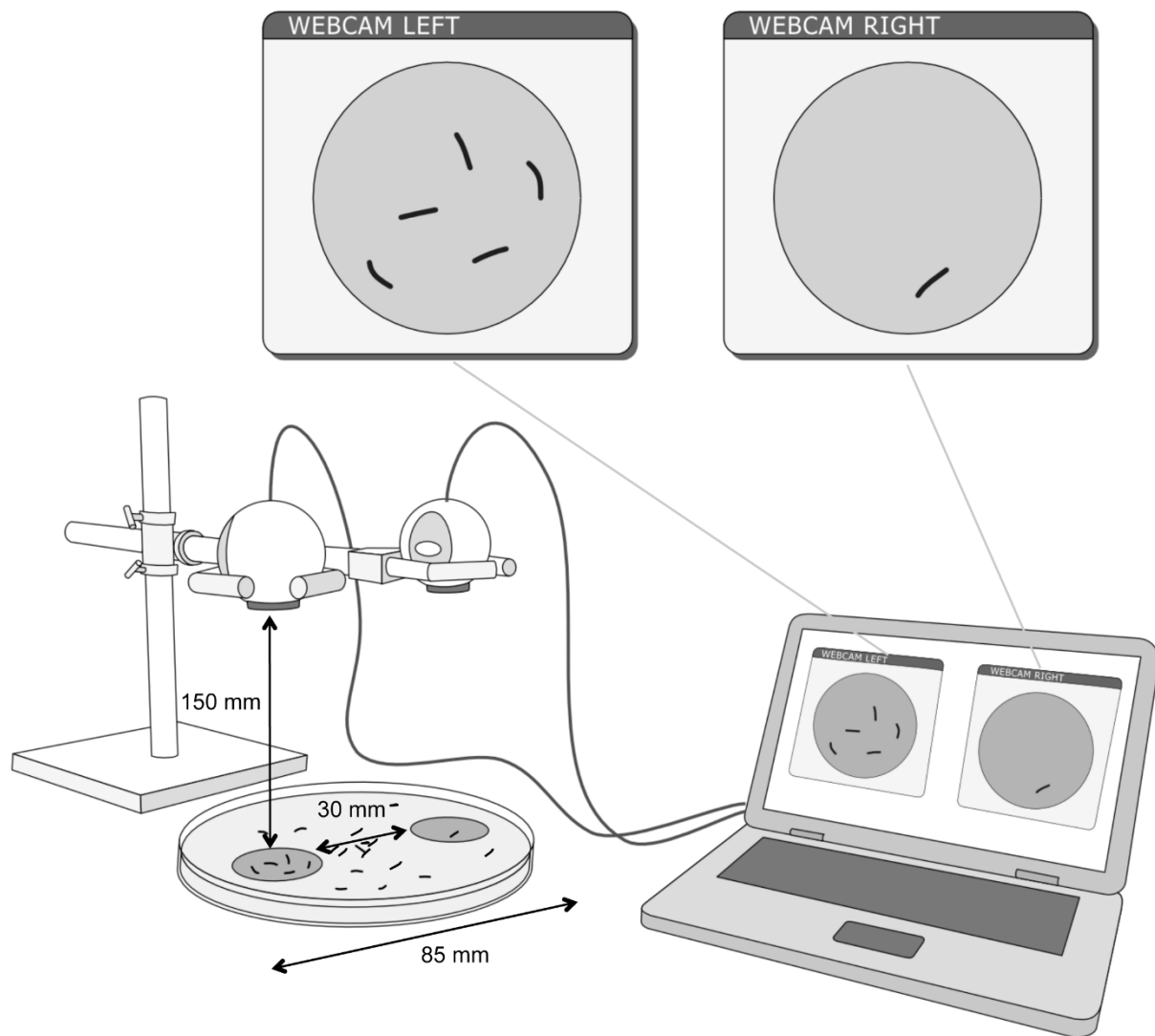


Fig. S2. Experimental setup for testing larvae. Groups of second instar larvae were tested in small plastic arenas filled with 8 mL of agar-gelled water (30 g.L^{-1}) and two identical food patches. Food patches (grey discs) were made of 1.2 mL of artificial diet set in 22 mm circular wells in an agar basis. Before being tested, groups were food-deprived in a small Petri dish for 1 h. Each group was then transferred with a humidified paintbrush in the centre of the arena, midway between the two food patches. A webcam was positioned above each patch on a vertical support. Webcams were connected to a laptop computer and programmed to record images of food patches every minute during 1 h. The number of larvae on each image was counted automatically using an image analysis software (see detailed procedure in Fig. S3). Drawing by Pierre Vedel.

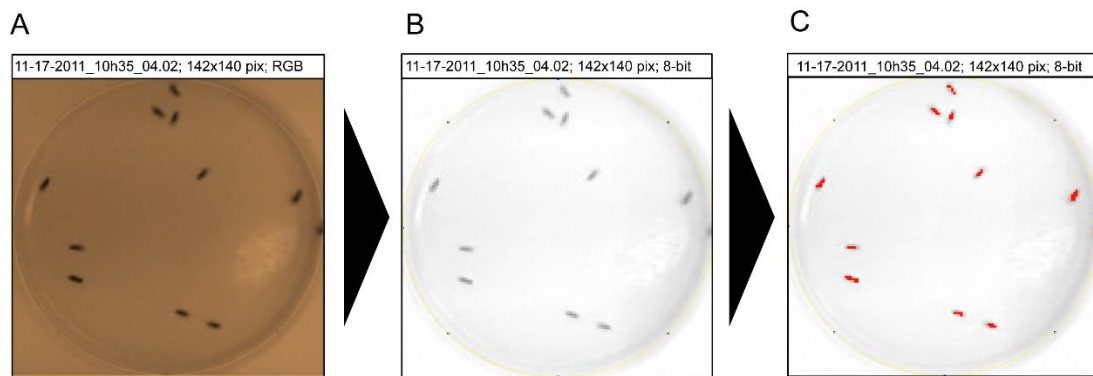


Fig. S3. Image analysis procedure. We monitored the choices of food patches by groups of *Drosophila* larvae and adults by recording images of patches with webcams every minute for 1 h (see details of experimental setups in Figs S1, S2). We processed and analysed the raw images using ImageJ (National Institute of Health, Bethesda). (A) Example of raw Red Green Blue (RGB) image of a food patch containing 11 adult flies. (B) 8-bit processed image. The background colour was subtracted before the RGB image was transformed in black and white 8-bit image. (C) The black and white sensitivity thresholds were adjusted so that every dark particle between 5 and 15 pixels (highlighted in red) indicates the position of an individual fly. We used the ImageJ particle analysis algorithm to automatically count the number of flies.

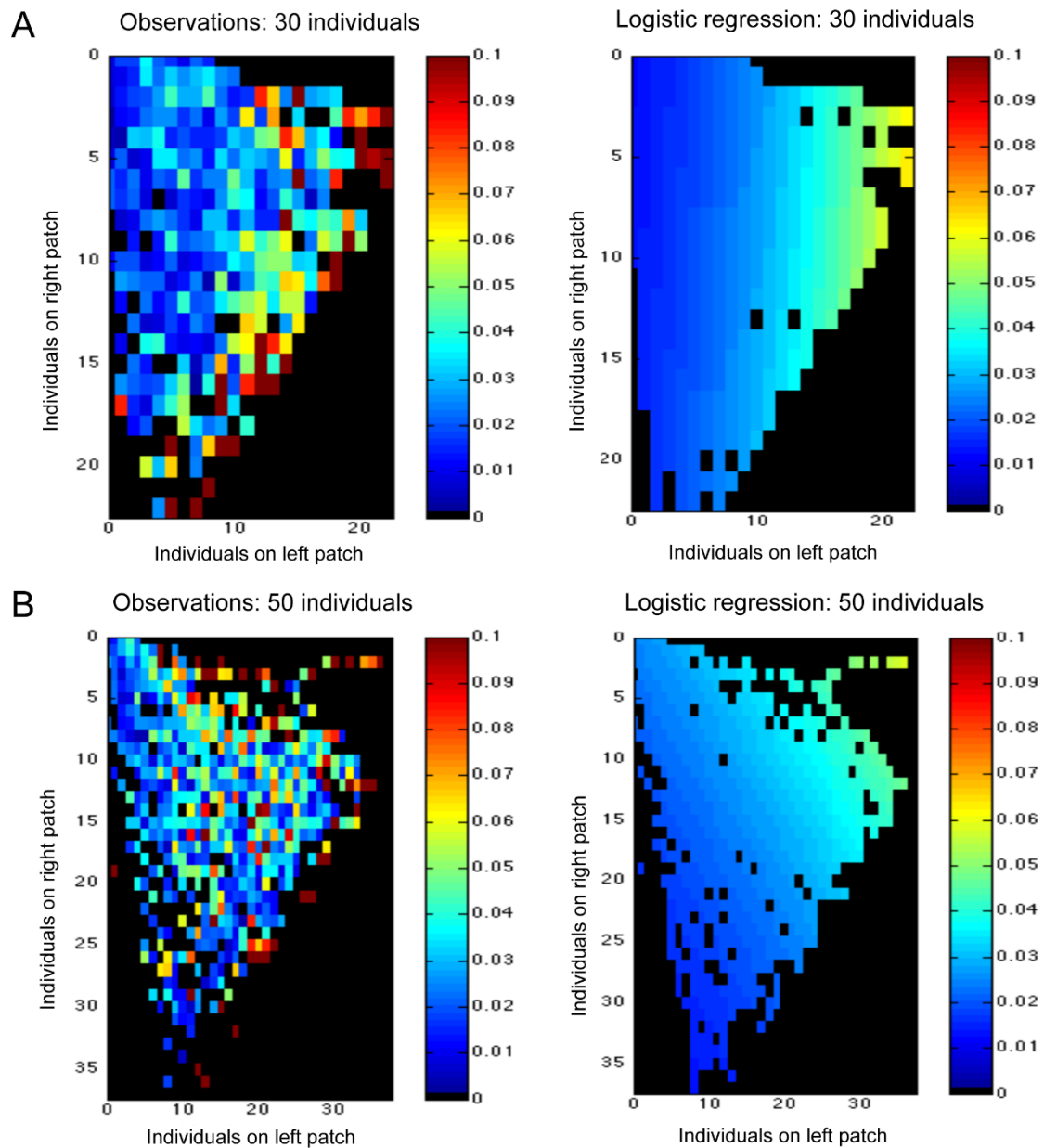


Fig. S4. Estimates of the probabilities of joining foods patches. Examples of probabilities of joining the left food patch for individuals that are not yet on a patch, in relation to the number of individuals already present on the left and the right patch (A) for groups of 30 individuals and (B) groups of 50 individuals, as measured in the behavioural experiments on mated females (observations) and predicted by the logistic regression.

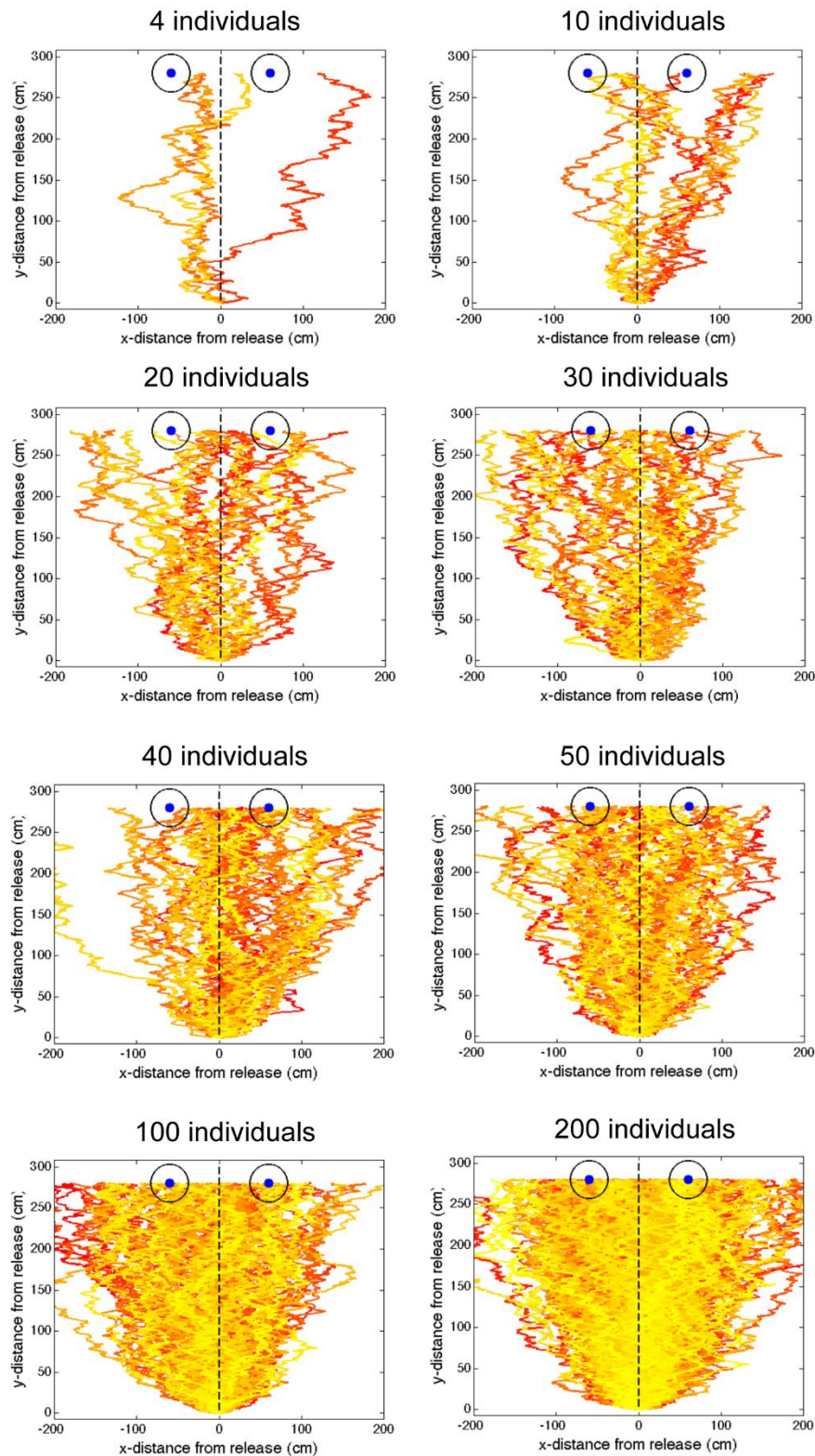


Fig. S5. Examples of simulation runs for groups of 4 to 200 flies. In the individual-based model, each simulated fly is released at the origin (0,0) and performs a random search for food patches (black circles). The search is biased by the position and the number of

individuals already feeding at each of the patches so that the more individuals that are feeding at a patch the more attractive it is (see details in the main text and Appendix 1). Once an individual reaches the level of both food patches, it goes to the food patch that it is nearest to. In the simulation one fly leaves at a time. Different colours represent the tracks of different individuals. In all simulations $c = 5.3$.

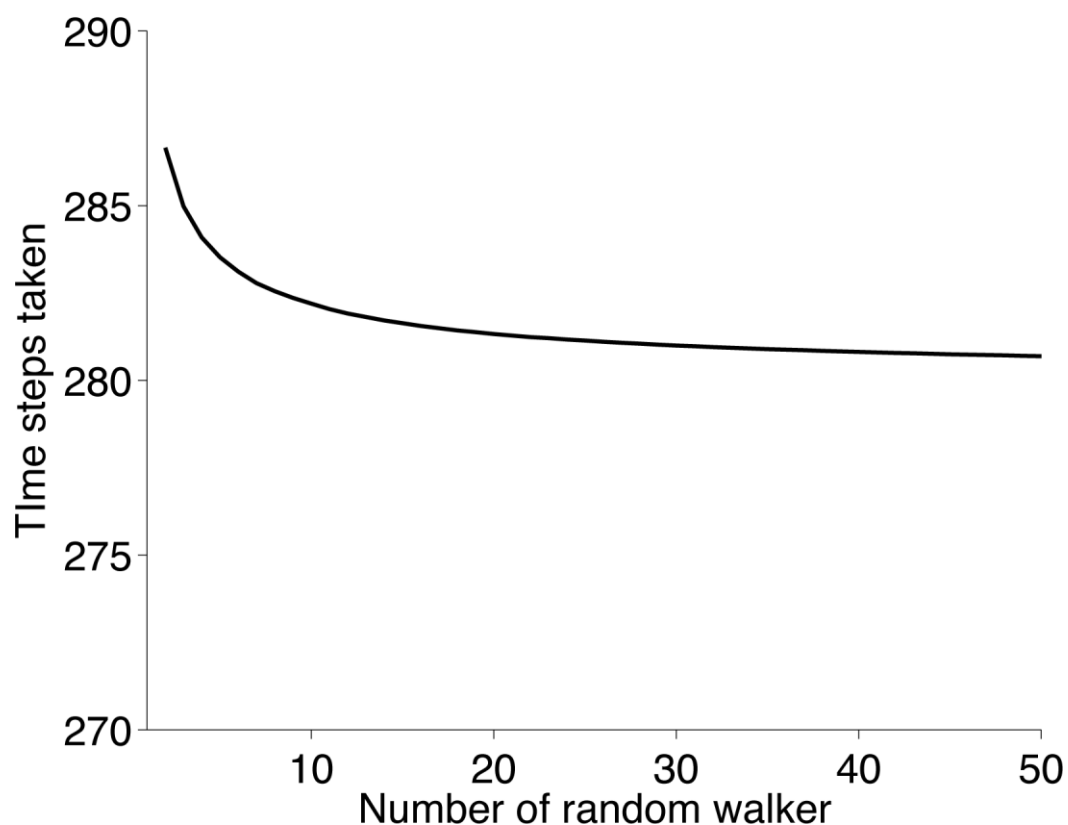


Fig. S6. Time taken for simulated flies to arrive at decision line. Number of steps until simulated flies reach the latitude of the two food patches as a function of the order in which the fly starts (in the simulation one fly leaves at a time). Parameter values as in Figure S5.

Table S1.

[Click here to Download Table S1](#)

Table S2. Results of the logistic regression applied to the probability of joining a food patch per individual for different group sizes (N).

The table shows the estimates (\pm s.e.m.) for parameters C , a and b (see details in main text), t and p values.

N	C			a			b		
	value	t	p	value	t	P	value	t	p
4	4.4726 ± 0.1858	24.0745	< 0.0001	2.0227 ± 0.5172	3.9111	< 0.0001	1.3820 ± 0.5702	2.4236	0.0154
10	4.7707 ± 0.1405	33.9504	< 0.0001	2.7438 ± 0.4598	5.9673	< 0.0001	0.2608 ± 0.5857	0.4452	0.6562
20	4.5059 ± 0.0969	46.5129	< 0.0001	1.4136 ± 0.3391	4.1685	< 0.0001	0.4550 ± 0.4180	1.0885	0.2763
30	4.2769 ± 0.0562	76.0750	< 0.0001	1.8838 ± 0.1591	11.8392	< 0.0001	0.3446 ± 0.1833	1.8800	0.0601
40	4.0349 ± 0.0406	99.3484	< 0.0001	1.8030 ± 0.1209	14.9151	< 0.0001	-0.0864 ± 0.1357	-0.6368	0.5242
50	3.7008 ± 0.0488	75.8518	< 0.0001	0.8074 ± 0.1564	5.1607	< 0.0001	-0.7589 ± 0.1524	-4.9804	0.6916
100	3.8988 ± 0.0484	80.6049	< 0.0001	0.3455 ± 0.2106	1.6407	< 0.0001	-0.0788 ± 0.1986	-0.3966	0.8630
200	4.2809 ± 0.0380	110.8101	< 0.0001	1.3794 ± 0.208	6.60447	< 0.0001	0.0370 ± 0.2143	0.1726	0.0374