

Effects of floral symmetry and orientation on the consistency of pollinator entry angle

Supplementary Information

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1. Supplementary tables

Table S1: Table showing all individual workers used in the entry angle experiment with the colony they belonged to. The “X” mark which combinations of flower shape and angle they took part in. On the left most column is the total number of trials each worker participated in. The bottom most column shows how many trials were conducted per shape and angle combination. The shape and angle abbreviations are as follows: R: radial (circular flowers); B: bilateral (triangular flowers); Di: dissymmetrical (rectangular flowers); H: horizontal orientation; Do: downward orientation; U: upward orientation.

BeeID	Colony	Shape-Angle combination									Trials per bee
		R-H	R-Do	R-U	B-H	B-Do	B-U	Di-H	Di-Do	Di-U	
22	1	X		X	X						3
20	1	X			XX						3
21	1	X	X			X	X	X			5
24	1		X								1
25	1			X							1
27	1									X	1
26	1	X					X	X			3
23	1							X	X	X	3
28	1				X						1
7	1	X		XX	XX			X			6
8	1									X	1
5	1						X				1
4	1		X					X			2
2	1						X		X		2
10	1									X	1
11	1						X				1
12	1					X					1
30	2	X	X	X							3
40	2						X				1
34	2					X					1
32	2					X		X			2
52	2								X		1
22	2					X					1
35	2		X	X	X		X				4
41	2	X	X			X	X		XX	X	7
51	2				X						1
55	2								X		1
21	2							XX		X	3
38	2	X			X			X			3
23	2			X						X	2
70	2		X						X		2
71	2					XX	X		X	X	5
88	2	X	X	X	X						4
93	2						X				1
Trials per combination		9	8	8	10	8	10	9	8	8	

Table S2: Table showing all individual workers used in the landing time experiment. The “X” mark which combinations of flower shape and angle they took part in. On the left most column is the total number of trials each worker participated in. The bottom most column shows how many trials were conducted per shape and angle combination. The shape and angle abbreviations are as follows: R: radial (circular flowers); B: bilateral (triangular flowers); Di: dissymmetrical (rectangular flowers); H: horizontal orientation; Do: downward orientation; U: upward orientation.

BeeID	Colony	Shape-Angle combination									Trials per bee
		R-H	R-Do	R-U	B-H	B-Do	B-U	Di-H	Di-Do	Di-U	
30	2	X	X	X							3
40	2						X				1
34	2						X				1
32	2					X		X			2
52	2								X		1
22	2					X					1
35	2		X	X	X		X				4
41	2	X	X			X	X		XX	X	7
51	2				X						1
55	2								X		1
21	2							XX		X	3
38	2	X			X			X			3
23	2			X						X	2
70	2		X						X		2
71	2					XX	X		X		4
88	2	X	X	X	X					X	5
93	2						X				1
Trials per combination		4	5	4	4	5	6	4	6	4	

Table S3: Table showing the percentage of trials per symmetry and angle combination which exhibited unimodality.

Treatment			
Symmetry	Angle	Total Trials	Unimodality
Radial	Horizontal	9	9 (100%)
Radial	Downward	8	8 (100%)
Radial	Upward	8	8 (100%)
Bilateral	Horizontal	10	9 (90%)
Bilateral	Downward	8	5 (62.5%)
Bilateral	Upward	10	6 (60%)
Dissymmetrical	Horizontal	9	9 (100%)
Dissymmetrical	Downward	8	8 (100%)
Dissymmetrical	Upward	8	7 (87.5%)

2. Pictures of training flowers and training layout

Figure S1. Top: Birds eye view of training grid with petri dish supplementary feeders in the upwards orientation. This picture is taken during the first training phase where the association between the artificial flowers and a nectar reward is taught. Training grid feature all three flowers shapes; circular (radial), triangular (bilateral), and rectangular (dissymmetrical). The supplementary feeders were added to increase the total amount of nectar available for the bees to forage; Bottom: Same setup as A but at a different angle.

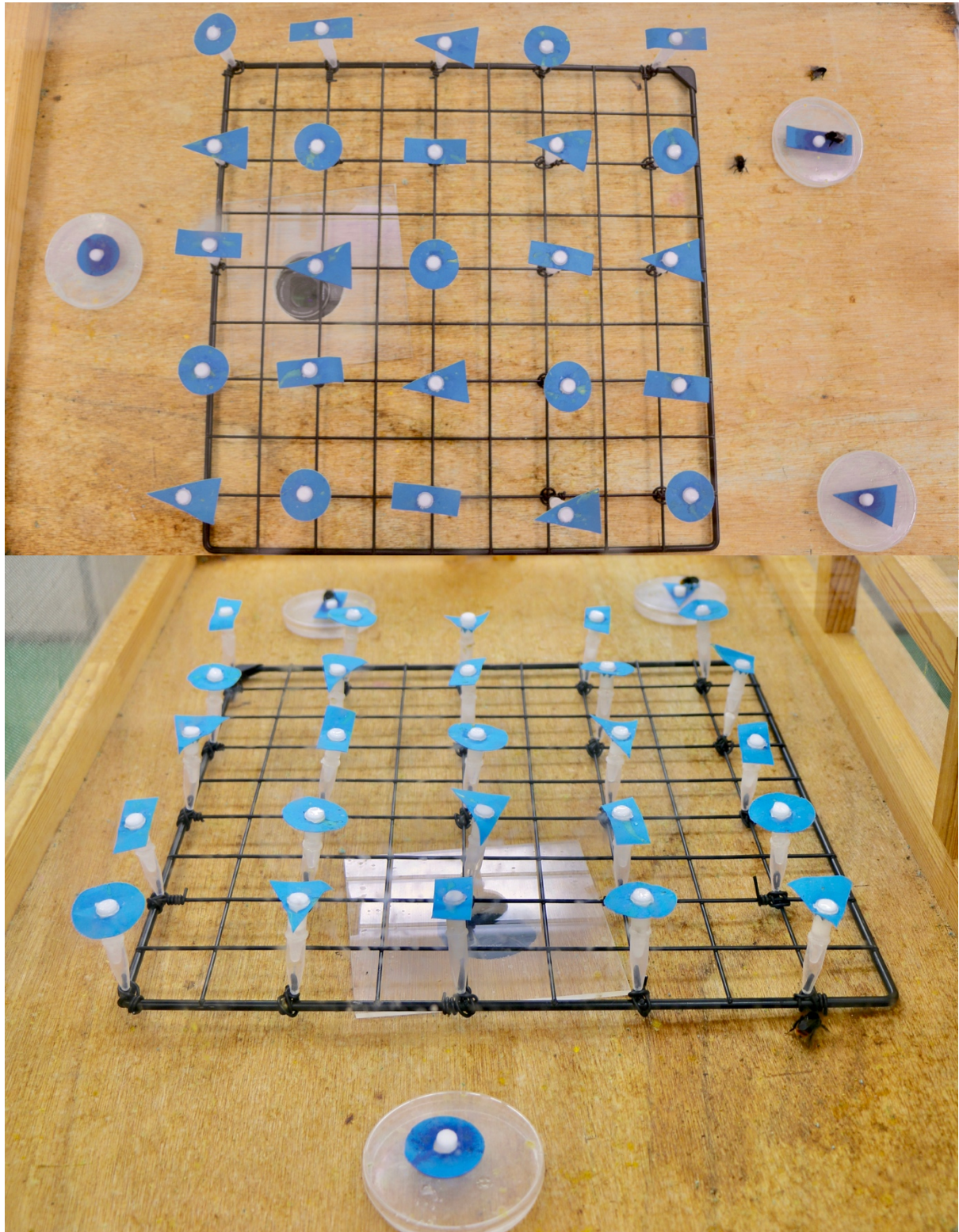


Figure S2: Left: Picture of advanced training phase. The grids are laid out in the horizontal position and downward position; B: Picture of advanced training phase with horizontal and upward position. The paper corolla on the supplementary petri dish feeders were replaced as the previous ones had become dirty.



3. Pictures of experimental flowers and experimental layout

Figure S3: Left: Experimental grid with triangular (bilateral) flowers in the upward orientation; Top right: Experimental grid with triangular (bilateral) flowers in the downward orientation; Bottom right: Experimental grid with triangular (bilateral) flowers in the horizontal orientation.

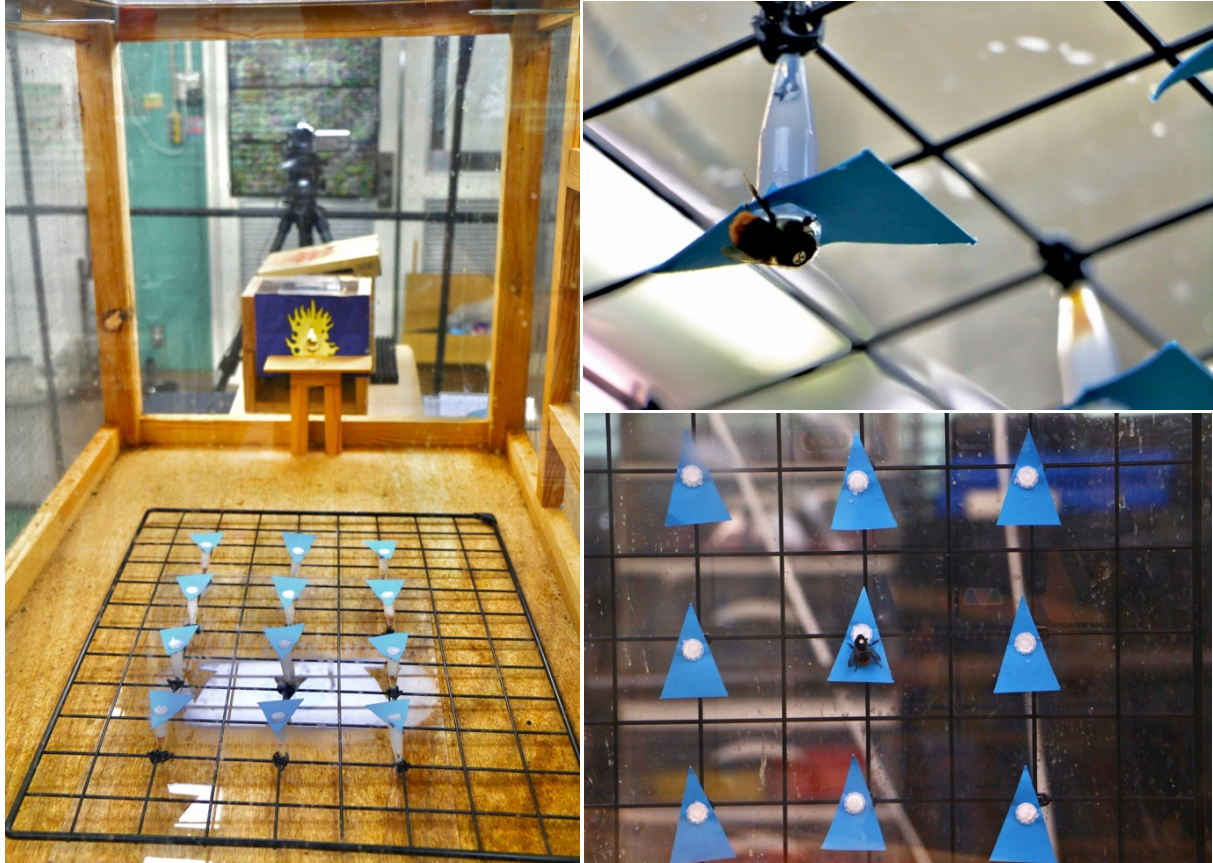


Figure S4: Left: Experimental grid with rectangular (disymmetrical) flowers in the upward orientation; Right: Experimental grid with rectangular (disymmetrical) flowers in the horizontal orientation.

