Dataset description for: How bumblebees coordinate path integration and body orientation at the start of their first learning flight

The data for each bee in the is held in matlab files with the name as follows:

FB8_LN01PR_1215_240615_Published.mat

FG3_LF01C3_1057_231014a_Published.mat

The identity of the ant is encoded by the first 3 characters of the title before the first '_'

The next code before the second '_' indicates the type of experiment. PR indicates that there was a purple ring around the nest, while C3 indicates there were 3 landmarks.

LN and LF both indicate that it was a learning flight, and the trial number is indicated by the number after the LN/LF which in this data set is 1 as it was the first flight.

The time and date of the experiment are the last 2 numbers respectively eg here 12.14 and 24th June 2015 for the first file

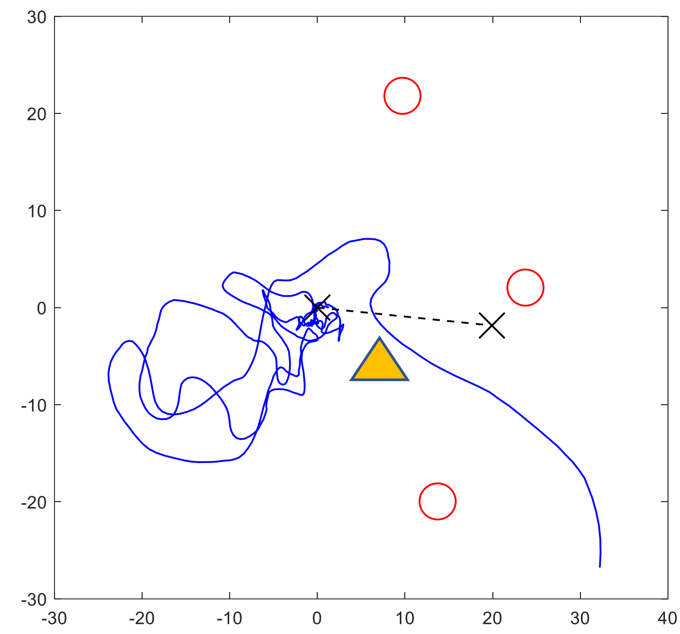
In each file there are the following variables which hold data for the bee's position and orientation for each frame of the video for which the bee was detectable:

- t is the time point from the start of video recording in seconds for every frame in which the bee was able to be detected. Typically, this is every frame but if the bee goes out of shot, or the bee is undetectable t will increase irregularly, or there will be gaps
- Cents is a 2D column vector giving the [x,y] position of the bee, relative to the nest, in cm. The nest position is in the variable nest= [0,0] by default
- However, because the data are taken from a camera where y=0 is at the top of the screen the way we have shown the trajectories in the experiments is with this convention which basically means the y-axis should run down the page to make it the same as is seen in the video. To do this (in Matlab) one does: set(gca,'YDir','reverse'). This does not affect the data but affects how it is plotted and how one interprets angles (see figure 1 below for detail)
- The positions of the landmarks are held in the variables LM where each row is the x,y position. The diameters of the landmarks are each given in the variable LMWid.
- sOr is the body angle of the bee, ie it's facing direction, in radians. This angle is given relative to the 'North' direction which is set in the variable 'compassDir'. The variable northPos is included so one can plot the direction of North. See figures for details

Plotting the data: Regarding the way we display the data and the fact that y increases from top to bottom, this can be easily done by the command (in Matlab): set(gca,'YDir','reverse')

So, to plot the 20th to 40th data points of the trajectory for Bee FG3 on trial 43 you do the following in matlab:

```
load FG3_LF01C3_1057_231014a_Published.mat
plot(Cents(20:40,1),Cents(20:40,2),'b-x',nest(1),nest(2),'gx',LM(:,1),LM(:,2),'ro',
northPos(1),northPos(2),'cd','MarkerSize',20,'LineWidth',1)
axis equal
set(gca,'YDir','reverse')
```

Figure 1: trajectory of bee FG3 (blue line). Nest is at [0,0] with direction of North indicated by dashed line between the X's. Landmarks are red O's The yellow triangle shows the start of the time course given in Figure 2	

NOTICE THAT NOW Y INCREASES DOWN THE PAGE. This does not affect the positions but the bee trajectory now appears as it does on the video

Figure 2: sOr, the body angle of the bee. sOr is stored in radians but shown here in degrees, from the point indicated by the yellow triangle in Figure 1 to the end. sOr is given relative to North with angles increasing clockwise. Here the ant initially moves down and right away from the release-food direction but ends at ~90° to it.