**READ ME File For 'Dataset for Extremely Low Frequency Electromagnetic Fields impair the Cognitive and Motor Abilities of Honey Bees'**

**Dataset DOI: 10.5258/SOTON/D0415**

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These files contain the datasets and videos related to the manuscript *‘Extremely Low Frequency Electromagnetic Fields impair the Cognitive and Motor Abilities of Honey Bees’*, to be published in *Scientific Reports*.

**How to use these files:**

 **Feeding Data.xlsx**

This spreadsheet contains data for feeding experiments that were conducted in the field in flight cages.

Column Title:

‘Hive’ - The number nucleus hive which data was collected from

‘Treatment’ - The treatment that was applied, which may be ‘Control’ or ‘100µT EMF’

‘Bees feeding…’ - The number of bees that were feeding in the final time point before the treatment was applied i.e. the baseline levels of feeding for that hive.

‘Number feeding…’ - The number of bees feeding at each time point during the respective treatment from 1-15 minutes.’

‘Number relative…’ - The number of bees feeding at each time point during the respective treatment from 1-15 minutes, relative to the number of bees feeding before the treatment was applied i.e. the change from baseline feeding levels.

 **Field Flight Data.xlsx**

This spreadsheet contains data for flight experiments that were conducted in the field in flight cages.

Column Title:

‘Hive’ - The number nucleus hive which data was collected from

‘Pre or Treatment’ - Definition of whether data was collected in the pre-treatment time period, to determine baseline flight success levels, or during the treatment time period.

‘Treatment’ - Specifying whether the main treatment was ‘Control’ or ‘100µT EMF’. NOTE: during pre-treatment no EMF was applied. For a row which reads ‘pre-treatment-EMF’ this means that the data is the pre-treatment collected prior to EMF application, and was used to form the baseline data for EMF changes from baseline levels.

‘Total passes’ - The total number of bee passes through the experimental arena in the 15 minute time period.

‘Outcomes, number’ - The number of passes that ended in each outcome. Total equals the ‘Total passes’. Outcomes are defined firstly by the location, either outgoing passes, which were bee flight paths from the hive towards the feeder, or returning passes, which were flight paths from the feeder back to the hive. Passes were then defined as ‘successful’ or ‘failed.’ Successful passes were flights that completely progressed through the coils in the EMF experimental area. Failed passes were those that entered the EMF experimental area but did not go through.

‘Outcomes, percent’ - These are the outcomes as defined in the previous column, but converted to a percentage of the total passes recorded in that 15 minute time period to control for variation in bee activity over time and between hives.

‘Percent change’ - This is the change in the percentage or a particular outcome ‘outgoing successful’, ‘outgoing failed’, ‘returning successful’, or ‘returning failed’ from the pre-treatment to treatment time period, for ‘Control’ or ‘100µT EMF’ treatments, for each of the 6 nucleus hives. For example, if 20% of flights were outgoing and successful in pre-treatment, and 15% were outgoing and successful in the treatment, then the percentage change would be -5%.

**Lab Flight Tethered Data.xlsx**

This spreadsheet contains data for flight experiments that were conducted in the lab with tethered bees suspended in the coil apparatus.

Column Title:

‘Hive’ - The number hive which bees were collected from

‘Treatment’ - The treatment that was applied, which may be ‘Control’, ‘100µT EMF’, ‘1000µT EMF’, or ‘7000µT EMF’

‘Number’ - The bee ID within each hive and treatment.

‘Pre wingbeat freq’ - The wingbeat frequency in Hz (full wingbeat cycles per second) of each bee before control or EMF treatment application.

‘Post wingbeat freq’ - The wingbeat frequency in Hz (full wingbeat cycles per second) of each bee 2.5 seconds after control or EMF treatment application.

‘Change’ - The change in wingbeat frequency in Hz (full wingbeat cycles per second) of each bee from pre to post-treatment.

 **PER Data.xlsx**

 This spreadsheet contains data for PER experiments.

‘Hive’ - The number hive which bees were collected from

‘Treatment’ - The treatment that was applied for 1 minute between each conditioning trial in the PER assay, which may be ‘Control’, ‘20µT EMF’, ‘100µT EMF’, or ‘1000µT EMF’

‘ID’ - The bee ID within each hive and treatment

‘Trial and retention’ - The conditioning trials 1-5 as well as the 1hr retention test conducted after conditioning, in the PER assay. ‘1’ = Proboscis extension response to the conditioned stimulus, before sugar reward, ‘0’ = Proboscis extension response to the unconditioned stimulus, but not to the conditioned stimulus i.e. a gustatory response, ‘-‘ failed extension of the proboscis at any point during the trial i.e. failed gustatory response.

‘Failed gustatory’ - Bee which failed criteria for gustatory responsiveness to be included in PER analysis.

‘Failed linalool’ - Bee which already exhibited a conditioned response to linalool in the first conditioning trial, and consequentially could not be included in analysis.

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