Key to '*Fruit Fly Feeding Behaviour*'

OBJECTIVE

By analyzing the data, we would like to study the feeding behaviour of the starved and fed flies, and their differences.

DEFINITIONS

Feeding state: at a given time point, the fly is on the pad. This is also known as state (1).

Resting state: at a given time point, the fly is not on the pad. This is also known as state (0).

***True* Feeding time interval**: the fly stays on the sensing pad, where it drinks the sugar water, for at least 5 seconds or longer, until it is no longer on the pad. This is considered one interval.

***False* Feeding time interval**: the fly stays on the sensing pad for less than 5 seconds.

***True* Resting time interval**: the fly is off the sensing pad for at least 10 seconds or longer, until it lands on the pad. This is considered one interval.

***False* Resting time interval**: the fly is off the sensing pad for less than 10 seconds.

ASSUMPTIONS

Assumption 1

The time data is in seconds and for each given point of time it must be categorized as either feeding (1) or resting (0); there is no other state than feeding and resting.

Assumption 2

Due to high sensitivity of the pad and frequent movement of flies, we make the following assumptions for the cases.

Case 1: There are two, same, *true* state time intervals. In between them, there is a single (or multiple) *false* state time interval(s).

- Then the intervals altogether are considered as one true state time interval. The state of this time interval is equivalent to whatever state the two true intervals is.

Case 2: There are two, different, *true* state time intervals. In the first true state, the fly is resting and in the second true state, the fly is feeding. In between them, there is a single (or multiple) *false* state time interval(s).

- Then the true resting interval and its following false interval(s) are together considered as one true resting time interval, and the true feeding interval remains as its own true interval. In other words, there is one true resting interval and then following is the true feeding interval.

Case 3: There are two, different, *true* state time intervals. In the first true state, the fly is feeding and in the second true state, the fly is resting. In between them, there is a single (or multiple) *false* state time interval(s).

- Then the true feeding interval and its following false interval(s) are together considered as one true feeding time interval, and the true resting interval remains as its own true interval. In other words, there is one true feeding interval and then following is the true resting interval.

Other cases: Consider the following examples.

- *True* feeding state – *True* resting state – *False* states – *True* resting state
  - Solution: *True* feeding state – *True* resting state
- *True* feeding state – *True* resting state – *False* states – *True* feeding state
  - Solution: *True* feeding state – *True* resting state – *True* feeding state
- *True* resting state – *True* feeding state – *False* states – *True* feeding state
  - Solution: *True* resting state – *True* feeding state
- *True* resting state – *True* feeding state – *False* states – *True* resting state
  - Solution: *True* resting state – *True* feeding state – *True* resting state

DATA COLLECTION

For each collection of data, one fly is placed in a container with the sensing pad on which there is a small well of glucose water. Once the fly is released in the container, the data is collected for the next 30 minutes. For this analysis, seven female fruit flies were used; four flies were starved, and three flies were fed before releasing in their container.

METHOD OF ANALYSIS

Boxplot is produced for each feeding and resting period for the seven flies to compare their lengths of time. Then, a cumulative frequency graph was produced for each group of fed and group of starved flies.