Amir Jafari[1]

# Open Field Test Entries/Time Spend in Corner, Border, and Center: from *.csv files

## Introduction

An open field test is a common method used in neuroscience research to study the behavior of animals in a controlled environment. In this test, an animal is placed in a large, open area and its behavior is observed and recorded. This test is often used to study anxiety, stress, and other psychological states in animals. The open field test is typically divided into three sections: the **corners**, the **borders**, and the **center**. These sections are used to measure different aspects of the animal's behavior. For example, the **corners** of the open field are typically considered to be the most stressful and anxiety-provoking part of the environment, while the center is typically considered to be the least stressful and anxiety-provoking part. The behavior of an animal in the different sections of the open field can provide valuable insights into its psychological state. For example, an animal that spends more time in the corners and borders of the open field may be experiencing higher levels of anxiety or stress, while an animal that spends more time in the **center** may be experiencing lower levels of anxiety or stress. Overall, the open field test is a useful tool for studying the effects of stress and anxiety on behavior in animals, and it can provide valuable insights into the psychological processes underlying these states.

## How to get CSV files

EZ-Track is a program used for analyzing animal behavior in laboratory experiments. It allows researchers to automatically track the movement and behavior of animals in real-time or using specialized software and hardware. With EZ-Track, researchers can set up virtual zones within an experimental arena and track the animals as they move around. This can provide valuable information about the animals' behavior, such as how much time they spend in each zone, how many times they cross into each zone, and what types of behaviors they exhibit in each zone. EZ-Track can also be used to analyze other aspects of animal behavior, such as the animals' locomotion and movements, their social interactions, and their response to stimuli. This can provide valuable insights into the animals' behavior and help researchers better understand their psychological and physiological processes. So, EZ-Track is a useful tool for studying animal behavior in the laboratory, and it can provide valuable insights into the psychological and physiological processes underlying animal behavior. Please keep in your mind that you would have following information in the “ROI_location” in csv file which are: 'c1', 'c2', 'c3', 'c4', 'b1', 'b2', 'b3', 'b4' , 'center', 'b1_center', 'b2_center', 'b3_center', 'b4_center', 'c1_b1', 'c1_b4', 'c4_b4',

1-Neurophysiology laboratory, Roberto Alcantara Gomes institttute, biomedical center, Rio de Janeiro University State, Av. Prof. Manoel de Abreu 444, 5 andar, Vila Isabel, Rio de Janeiro, RJ 20550-170, Brazil

'c4_b3', 'c3_b3', 'c3_b2','c2_b2', 'c2_b1' ,'non_roi'. So, might you find it helpful in the animal directionality related studies, having some specific information about the crossing corner to border (c-b) imaginary lines (which are literally infinitesimally narrow lines in program), or border to center (b-center) would be an advantage, and there is some unpublished implication, as like has been shown in **Figure 1** just for one csv file as an example.

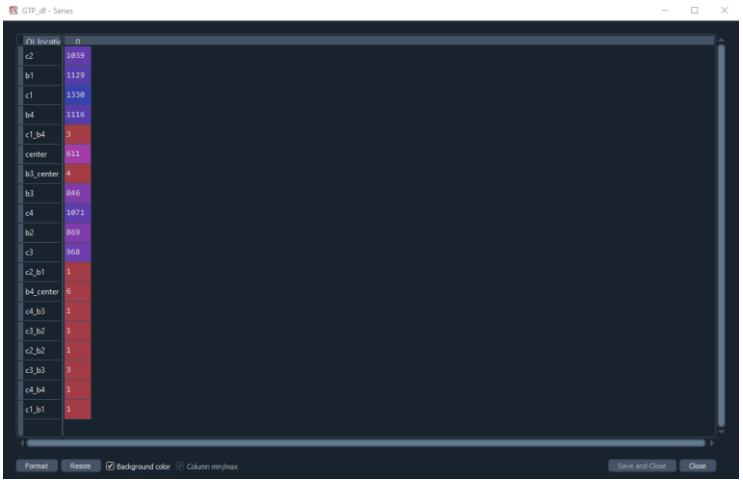


**Figure 1:** The illustration of extractable information from EZ-Track program for open field test

## This codes extracts which information

The code imports the required libraries, sets the path to the directory containing the CSV files, that has been obtained from Ez-tracker program to extract entries to corner, border, and center in conjugation with the frames which they spend in each single targeted section and cleared in Figure 1. This code uses the glob module to get a list of all CSV files in that directory.

It then loops through the list of files, reads each file as a Pandas DataFrame, drops the rows with index greater than 9000 (30 f per sec * 60 sec * 5 min), groups the data by the 'ROI_location' column, and gets the size of each group. The resulting DataFrame is appended to a list of DataFrames. The list of DataFrames is then concatenated into a single DataFrame and the missing values are filled with zeros. The DataFrame is then melted to create a new DataFrame with two columns - 'Label' and 'Value' - and the resulting DataFrame is printed and saved as a CSV file.

1-Neurophysiology laboratory, Roberto Alcantara Gomes instittute, biomedical center, Rio de Janeiro University State, Av. Prof. Manoel de Abreu 444, 5 andar, Vila Isabel, Rio de Janeiro, RJ 20550-170, Brazil

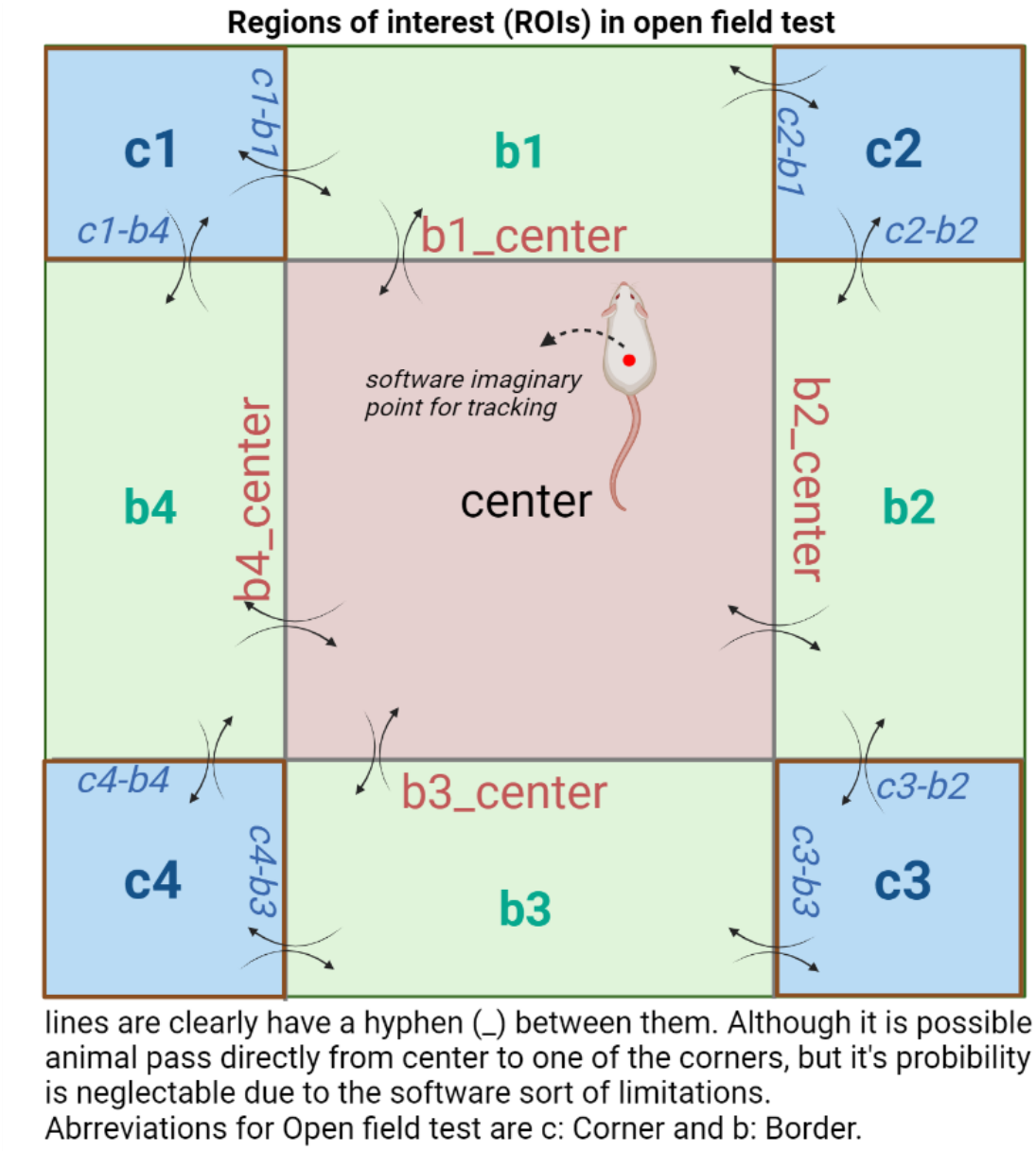


**Figure 2:** Represents the open field test imaginary sectioning (lines & areas) to measure behavior related subjects

## Count animal entries in open field test

To count the number of animal entries into a particular zone in an open field test, you can use the following formula:

Number of entries = Total number of animal crosses - 1

Here, the "total number of animal crosses" refers to the total number of times the animal crossed the boundary of the particular zone in question. The "- 1" at the end of the formula is used to account for the initial entry of the animal into the zone, which is not counted as an entry. For example, let's say you are conducting an open field test with a mouse, and you want to count the number of entries the mouse makes into the center zone of the open field. If the mouse crosses the boundary of the center zone a total of 10 times, the number of entries the mouse makes into the center zone would be calculated as follows:

Number of entries = 10 crosses - 1 = 9 entries

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In this example, the mouse makes a total of 9 entries into the center zone of the open field. You can use this formula to count the number of entries an animal makes into any zone in an open field test, provided you have accurate data on the total number of times the animal crosses the boundary of the zone. This can provide valuable information about the animal's behavior in the open field and help you better understand its psychological and physiological processes.

# Conclusion

To use the open field test to study animal behavior in neuroscience research, you can follow these steps:

- Set up the open field test environment.
- Place the animal in the open field and observe its behavior with plausibly with recorded camera videoes. This may involve using specialized tracking software and hardware to automatically record the animal's movements and behaviors in real-time, in our case it has been applied by EZ-Track open-source codes.
- Use the formula provided above to calculate the number of entries the animal makes into each of the zones (corners, borders, and center) in the open field.
- Calculate the total time (in our case is ***Frame*** (30 f per sec)) the animal spends in each of the zones. This can be done by dividing the total time of the experiment by the number of entries the animal makes into each zone.
- Analyze the data to identify any patterns or trends in the animal's behavior in the different zones of the open field. For example, you may find that the animal spends more time in the corners and borders of the open field, indicating a higher level of anxiety or stress.
- Use these data to draw conclusions about the animal's psychological state and behavior in the open field.

Therefore, the open field test is a valuable tool for studying animal behavior in neuroscience research, and can provide valuable insights into the psychological and physiological processes underlying animal behavior. By following the steps outlined above, you can use the open field test to study the behavior of animals in a controlled environment and better understand the effects of stress and anxiety on their behavior.

1-Neurophysiology laboratory, Roberto Alcantara Gomes institttute, biomedical center, Rio de Janeiro University State, Av. Prof. Manoel de Abreu 444, 5 andar, Vila Isabel, Rio de Janeiro, RJ 20550-170, Brazil