

What is Animal Play?

Play is repeated, incompletely functional behavior differing from more serious versions structurally, contextually, or ontogenetically, and initiated voluntarily when the animal is in a relaxed or low-stress setting.

'Even insects play together, as has been described by that excellent observer, P. Huber, who saw ants chasing and pretending to bite each other, like so many puppies' (Darwin, 1877: 65).'

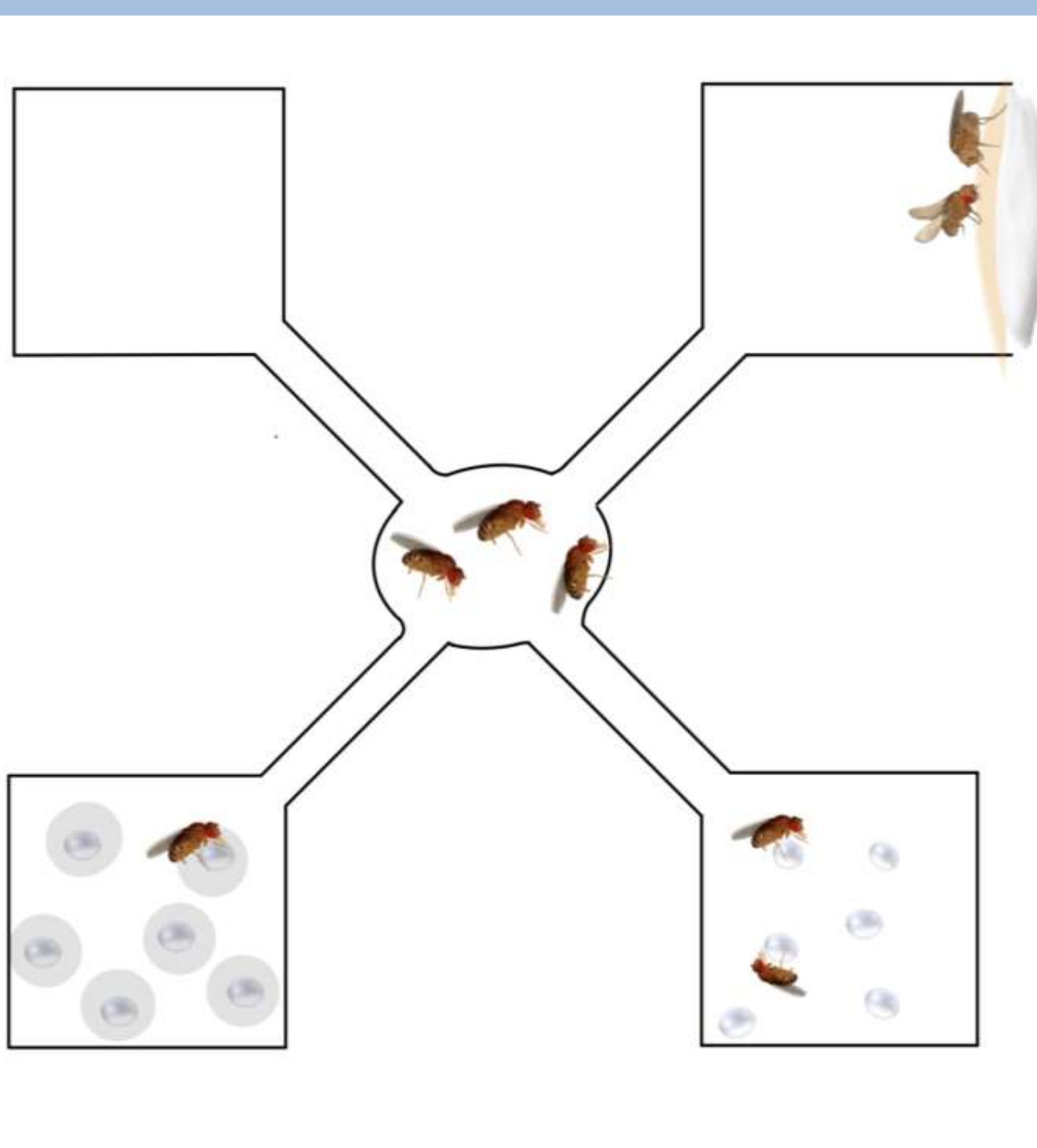
Could fruit flies be playing?

During the works of my supervisor Dr Durrieu on object learning in drosophila, the fruit flies would often roll balls for no apparent benefit. The question of play then arises, do drosophila have the potential to show a play-like behavior that is 'pleasurable'?

At the Neuroengineering Laboratory - Ramdya Lab, we developed an experiment to shed light on drosophila's object play and recognize the motor patterns involved in such behavior.

Therefore, we designed a behavioral study where we recorded flies' behavior using tracking tools during 24 hours.

Experimental procedure



Fly arena

The experiment was run during 24 hours. During this time, flies were given access to the arena containing both objects and food. Before starting the experimental day, all objects and the experimental arena were cleaned with water first and 70% ethanol to remove any odor cues left by subjects following object manipulation.

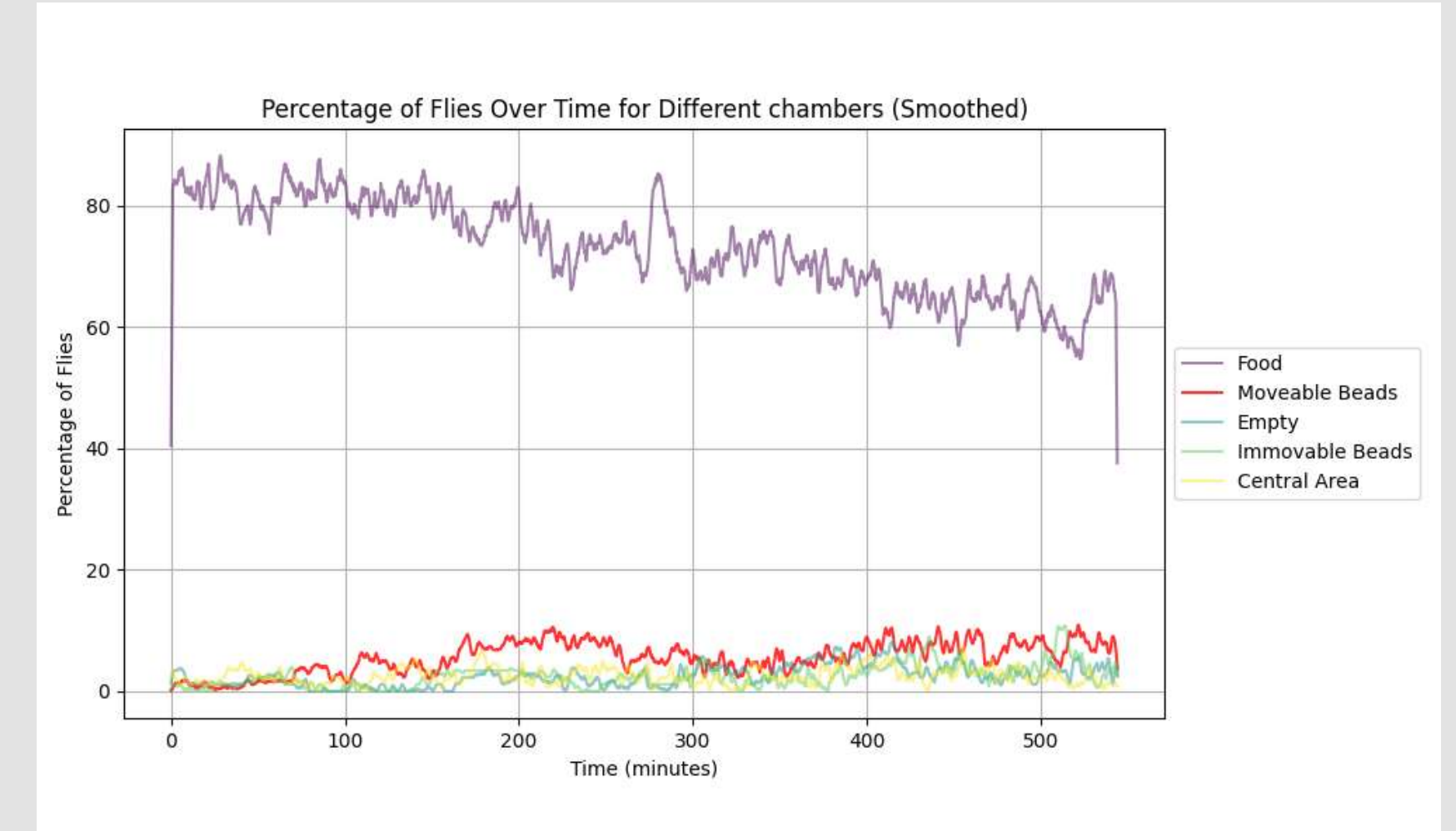
24 glass beads were pseudorandomly placed in both the mobile and immobile rooms, where the objects in the immobile object area were made stationary by gluing them to the floor with a small amount of wax, a neutral component whose odor is neutral to flies. Food was provided in a separate feeding area. Wet cotton was used to humidify the food for an optimal conservation.

The arenas are 4 mm of height to allow a low-stress setting.

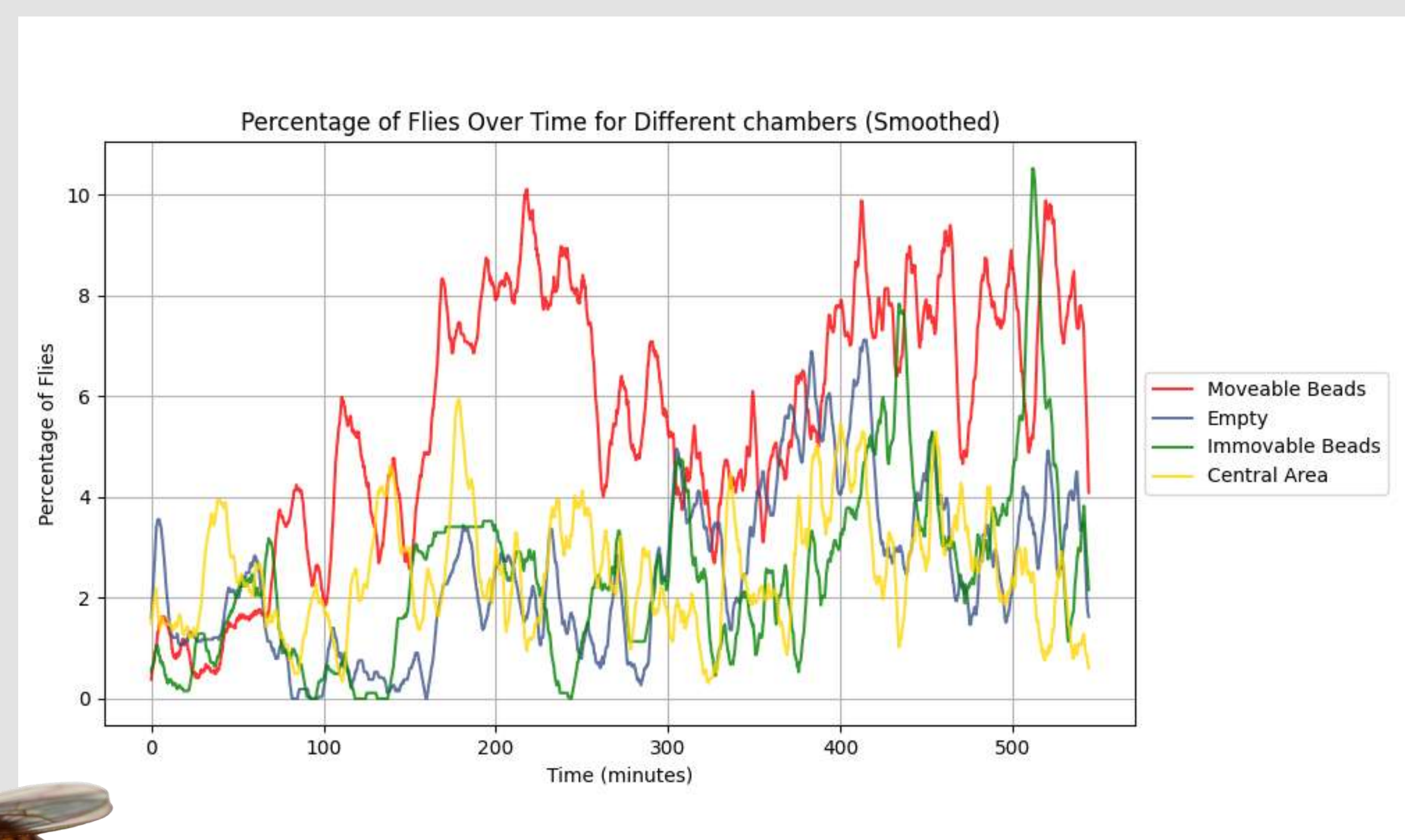


Results

The second graph represents the percentage of flies occupying the rooms from 6:30 am to 4 pm following the timeline of the first graphs:



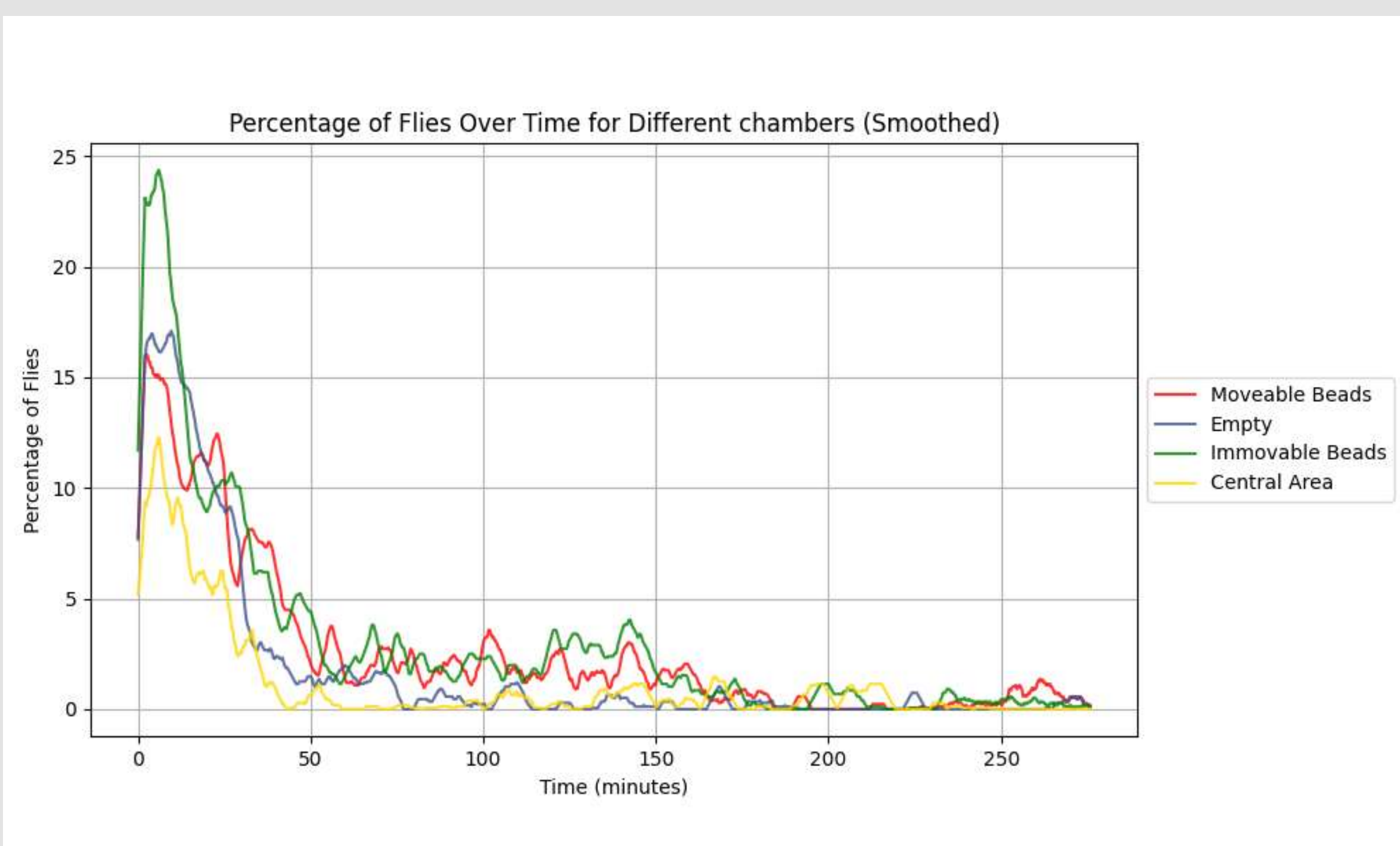
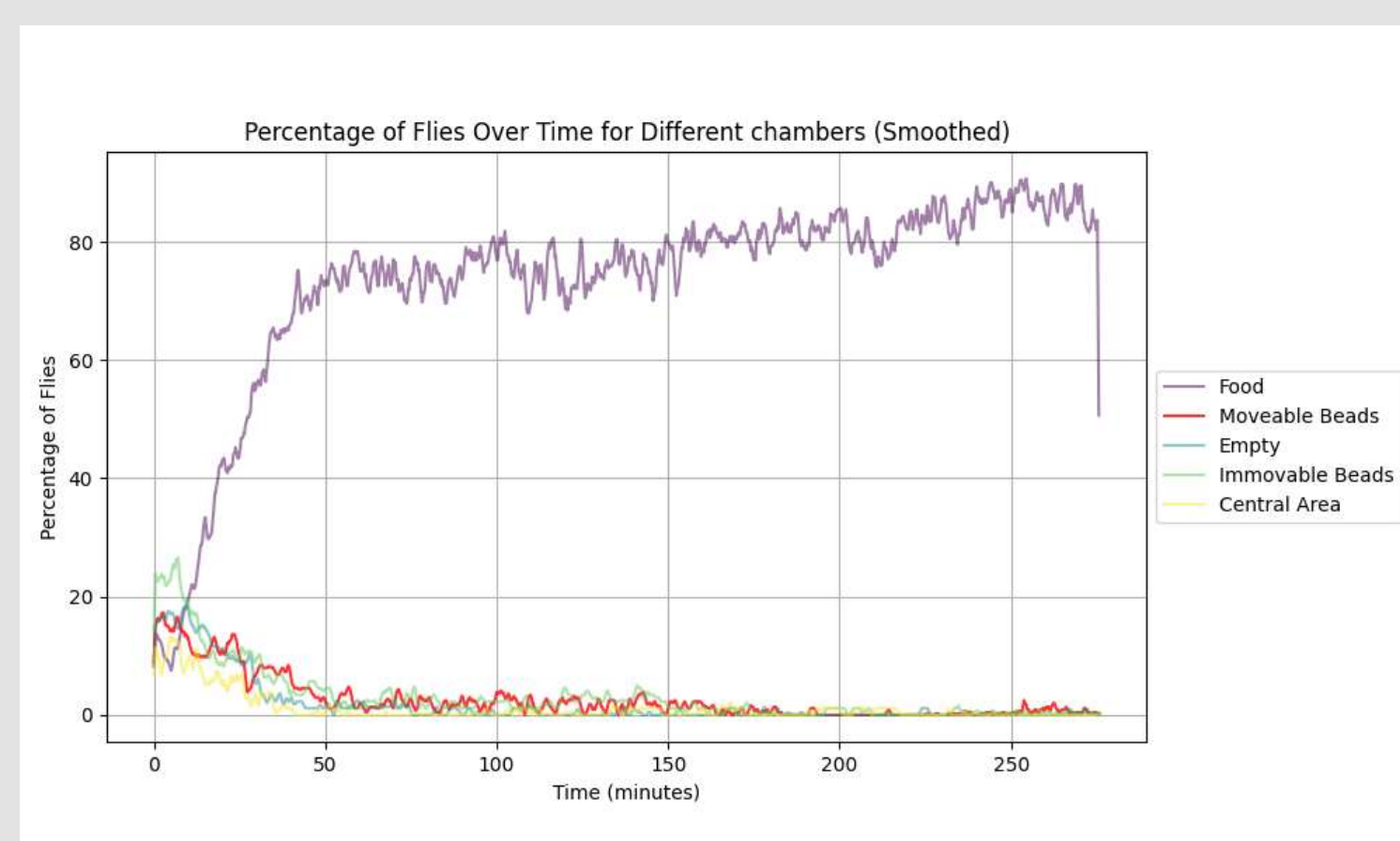
We observe an increasing preference for the room with the moveable beads and a slight decrease in the food room occupancy during the diurnal activity cycle.



Data Analysis

The frames from the recording were trained using SLEAP, and each rooms' occupancy was plotted using Matplotlib, Pandas and NumPy libraries. The first 5 hours of recording start at 4 pm till 9 pm :

We observe an equal distribution of the occupancy during the 30 first minutes corresponding to an exploratory behavior then an increasing preference for the food room while the occupancy in the other rooms decreases to a near zero percentage when approaching the night cycle.



Conclusion

Fruit flies appear to have a preference for the moveable beads room as shown in the plotted graphs. Additionally, many instances of ball movement were captured by our recording devices. Here are some *interesting* and *fun* videos!



If you wanna see flies rolling *two balls* from the *play room* to the *food room*!



How about a *close up* to some...*ball rolling*!



Wow our flies are *early birds*

Future Direction

This work should help establish the grounds for more research on the ways in which play behavior might benefit early brain development.

Playful recombination of motor patterns and responses into new sequences could, like rearrangements of genetic material, tend to increase the phenotypic variability of an animal's offspring (Fedigan ;1972,Feitelson and Ross ;1973).

Spread and elaboration of a novel behavior that may have originated in play is described by many scientists (Menzel ;1972, Gwinner ;1966). These "invented" patterns were later observed in goal-directed activity.Thus, the study of animal play may show the contribution of play as behavioral variation to evolution in invertebrates.

Most importantly, a deeper understanding of animal play would allow us to design and develop AI and micro-robots capable of developing novel behaviors through environmental experimentation, specifically play, as an aspect of behavioral ontogeny in which partially or totally mastered responses are varied and combined into new sequences.

References

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Acknowledgements

I would like to extend my gratitude to my supervisor Dr. Henry Matthias Durrieu for inspiring the project, and for his support throughout, to the Laidlaw Foundation for making it possible and to Professor Pavan Ramdya and everyone at the Neuroengineering Lab for their continuous feedback and support.