

## Question

Using mouse data, our group explored the question:

*“How does body temperature and activity scores for different mice differ over the 14 day period?”*

## Data

We merged four CSV files (female/male temperature and activity) and added new columns for each mouse’s activity, temperature, minutes, days, day/night indicators, and estrus. We emphasized daily aggregations, computing the mean, min, and max values for each of the fourteen days. The plotted dots represent the mean, while the tooltip displays all three values. These aggregates update dynamically based on chosen filters to provide additional context when a user hovers over a dot.

## Visual encodings and color palette

Our visualization is made up of two main components: the graph itself, and a collection of buttons representing filters for the data shown on the graph. The x-axis represents day number, while the y axis switches between activity score and body temperature in degrees Celsius. Since we have quantitative axes, we use dot plots with trend lines. Each dot represents a mouse or collection of mice, and reports its average temperature or activity score for that day. We connect the dots with trend lines, which reinforces to the reader that time is passing as we move from left to right.

The buttons are all neatly organized to the left of the graph, intended to be seen first by readers. The data shown depends entirely on the reader's selections, as the plot is defaulted to display no data before user interaction. The site’s color palette was selected to ensure intuitive readability, while complementing dynamic color changes for both the buttons and the trend lines when filtering. Each button has an intuitive color that stays active when selected, helpful symbols, and information tool tips to assist with what each button group does. Additionally, the selections made influence the visual elements of the graph. Selecting male, female, or both changes the dots (representing mice) to blue, pink, or grey, respectively, which are intuitive color choices. When the temperature option is selected, the trend line turns red, because body temperature is often associated with heat, as is the color red. When the activity score is selected,

the trend line turns green so as to not interfere with other visual encodings. Night and day, being the most broadly scoped features, change the entire webpage tint to either light yellow or light lavender, respectively. We chose not to include the estrus variable in our visualization since it only applies to a subset of the 14-day period, and we were interested in viewing trends across this entire period. Ultimately, all of these elements were chosen for the purpose of making sure the viewer knows what they are plotting, seeing, and interacting with, and to minimize misunderstandings and misinterpretation.

### **Overview of development process**

Our group preferred working synchronously rather than asynchronous. We met over Zoom and in person over the two weeks working over live shared code. The development process began with sketching what we wanted to have in our interactive page. Each of us created a prototype that targeted answering our question. We then took ideal components from each prototype to include in our final design. We debated two concepts of visualizations - one using a plot following temperature/activity by minutes, and the other using a scatterplot depicting average activity/temperature over the course of days. We chose the daily averages as it better highlights the broader trends, makes it easier to interpret data without minute-by-minute fluctuations, and decreases graph clutter. We also considered whether to showcase one chart or multiple, what filters to be used, how these filters would interact with each other, and the overall design choices of the page.

The most demanding aspect of our project was making sure that our various filters did not conflict with each other and cause confusing visuals. There were points where the filters did not work properly or even destroyed all functionality. We discovered that incorporating one filter at a time helped us avoid these pitfalls. At first, we all worked on engineering the filters together. Once we figured out the functionality, we worked on the styling separately, incorporating our own ideas. Altogether, we spent roughly fifteen hours each on developing our application.

### **Takeaways**

There is not one main takeaway from our visualization. It is open-ended and allows comparison between individual mice and groups. Interested readers can see data on any individual mouse from the study and either analyze changes over time or see specifics from any

day, or see these same statistics applied to different groups or filtered for different conditions. We designed our visualization with flexibility and versatility in mind. Some of our favorite takeaways were that female mice have higher body temperatures than males on average, and that all mice exhibit similar daytime activity levels, reflecting their nocturnal nature.