Introduction

In lab, the observations that were made that influenced this experiment were that several winged termites landed on student’s notes and specifically followed the writing on the paper. Were they attracted to the color of the pen, or the ink itself, or the indentions that the pen made, or something completely different? Initially as a group, we hypothesized that the termites were following the indentation of the pen on the paper in the scenario (as it may have mimicked grooves in wood). However, after testing, the termites moved randomly across the page with only indentions and no pen mark, but followed the pen trail on the other page. Termites communicate with chemical signaling through scent markings. As they go out in search for food, they leave droppings so that they can follow their scent back home and so others may follow as well (Matthews). So, for this experiment, we hypothesized that the termites were attracted to the chemicals in the ink of the pen.

Methods

The procedures for this experiment are as follow:

2. On two pieces of computer paper, trace the template trail with the pen on the left trail, and with pencil on the right trail. Place a garage sale sticker in the designated spot at the bottom of each trail.
3. On 2 more pieces of computer paper, trace the template trail with pen on the right trail, and with pencil on the left trail. Place a garage sale sticker in the designated spot.
4. Release a termite on the sticker where the trail on the left begins and start stopwatch 1.
5. Observe the termite’s movement and start the timer on stopwatch 2 if it wanders more than 2 cm from the trail.
6. At the end of 2 minutes, record how much time the termite spent on the trail by subtracting the time spent away from it (as kept on stopwatch 2).
7. Put the same termite on the sticker for the trail on the right side and start stopwatch 1.
8. Observe the termite’s movement and start the timer on stopwatch 2 if it wanders more than 2 cm from the trail.
9. At the end of 2 minutes, record how much time the termite spent on the trail by subtracting the time spent away from it (as kept on stopwatch 2).
10. Put the termite in a “used termite bin”.
11. Repeat steps 4-10 for 3 more trials, using the remaining pieces of computer paper for each trial.

One way to control for confounding variables is to be sure to use a different sheet of paper for each trial. This will ensure that the termites are not following the chemical pheromones released on the paper by termites in previous trials that could influence their movement. Additionally, use a different termite for each trial, and always put the termite on the left trail first, regardless of if it is pencil or pen.
This takes the termites endurance into account, ensuring that they are not always traveling the pen trail first and getting exhausted by the time they get to the pencil trail and potentially affecting results in that way.

After calculating the total time spent on each trail (for each trial), find the average amount of time spent on the pen trail (treatment group) and the average amount of time spent on the pencil trail (control group). Then, calculate the standard deviation and the standard error to determine the validity of the results and reveal the deviation of the sample from the population.

**Results/Conclusion**

The mean time spent on the trail with pen was found to be 54.54 seconds, while the trail with pencil was 21.62 seconds. The standard deviation for the treatment group was 42.24 seconds, and for the control group was 25.87 seconds. Finally, the standard error for the treatment group was 8.62, and for the control group was 5.28. These results show that overall, while there was variation throughout the trials, termites followed the pen trail for more than twice as long as they did the pencil trail. From this, the p-value was found to be 0.003. At a 5% significance level, with this p-value we are able to reject the null hypothesis that the mean difference between the time spent by each termite on the pen and pencil trails will not be significantly different from zero. This overall supports our experimental hypothesis, as the termites were proven to be attracted to the ink of the pen. It can be concluded that the chemicals in the ink of the pen somehow mimic the chemicals that termites use to communicate food sources, directions, etc., which ultimately explains why the termites followed the pen trail.

**References**