

The Effect of Lead Poisoning on the Behavior of Fathead Minnows

Introduction

Two separate fathead minnow tanks, one being lead poisoned, were monitored. Afterwards the monitors were to infer which tank was poisoned based on it’s comparison and discrepancies from common fathead minnow and lead poisoning behavior. The hypothesis being the poisoned tank would display less of common fathead minnow behavior and more of common lead poisoning behavior than the controlled tank.

Based on research and sources such as healthline.com lethargy, hyperactivity, and less reproductive behavior are signs of lead poisoning. The list also includes low intelligence and aggression.

More reproductive behaviors, darker coloration, presenting males, as well as evidence of attentiveness and intelligence are found to be signs of a non-poisoned fish.

This experiment was conducted to demonstrate how lead affects behavior of fathead minnows and if a lead poisoned fish could accurately be pointed out by said affects.

But this experiment goes much farther than minnows. "Lead is toxic wherever it is found, and it is found everywhere,” said a report from the Agency for Toxic Substances and Disease Registry to Congress. This quote in mind, the experiment benefits scientists by helping better identify and understand effects of lead poisoning in a safe and controlled environment. It is preparation for facing the lead problem plaguing our world and its communities with Milwaukee being majorly effected.

In addition to this, data shows overlap of poisoning symptoms between many animals. Therefore, this experiment could also benefit scientists by furthering background knowledge of lead effects when observing other species poisoned. This includes humans, who are highly affected. According to unicef.com a third of the world's children have lead poisoning.

Review

The lead poisoned fish displayed far less reproductive behavior. Referring to the graph of the data (graph one), there are very evident discrepancies between the tanks in number of nest preps, hovers, patrols, and spawns with the unleaded tank’s numbers being much higher. This suggest a higher sex drive.

The data collected was also put into t-test. As chart one shows, the results of nest prep, patrol, spawn, unidentified, and hover are all much lower than 0.05. This proves the two tanks' differences in the amount of these behaviors to be very significant. Although the controlled tank still had more chases, the two tanks had quite similar numbers in this category. Not to mention the t-test results are over 0.05.

In the poisoned tank, unidentified or outlier behavior was also commonly recorded, such as aggression, head banging, lethargy, and hyperactivity. As shown in graph one and chart one, the poisoned tank had much higher levels of this.

A side experiment was also run, conducted in attempts to record lack of attentiveness, lethargy, and poor learning abilities. Based on the experiment’s data graph (graph two), the poisoned tank showed more of these impairments.

Abstract

Reviewing all of this information, two tanks had data on fish behavior collected. The behavior either pointed towards a tank of control group fish or a tank of lead poisoned fish, following the hypothesis that the poisoned tank would display less of common fathead minnow behavior and more of common lead poisoning behavior.

Although satisfactory results were brought from this experiment and data seemed to back the hypothesis, it could use improvement. For example the data collectors could have been switched throughout the experiment to avoid bias. To avoid bias, theories and speculations could also have been reserved till all data was collected and reviewed.

Furthermore, to keep variables more constant the time the data was taken should have been the same each day.

Discussion

The behaviors in question are common reproductive behavior such as spawning, nest preparation, hovering, presenting, and chasing. Following the hypothesis, more of these behaviors in total, indicated a non led poisoned fish.

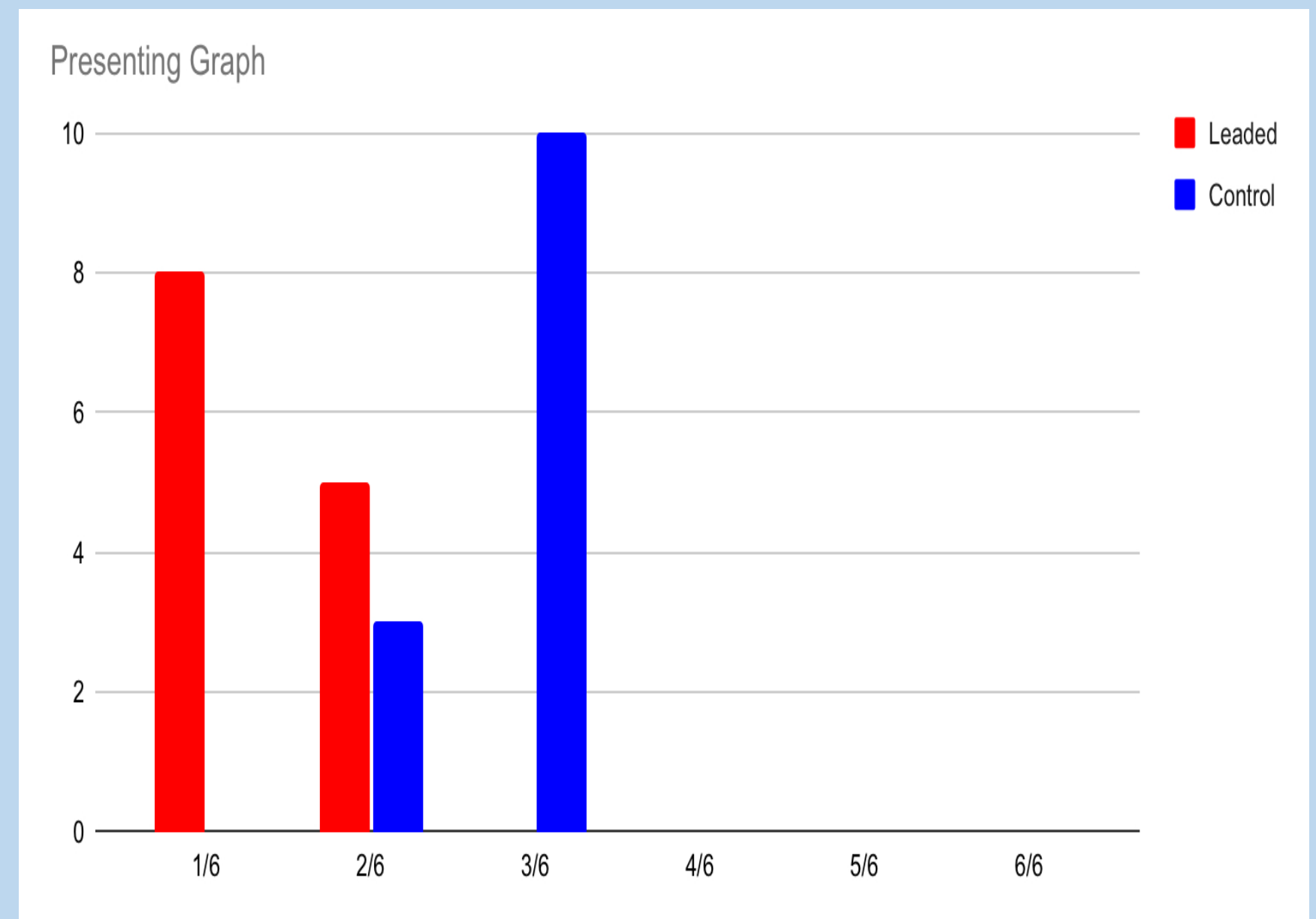
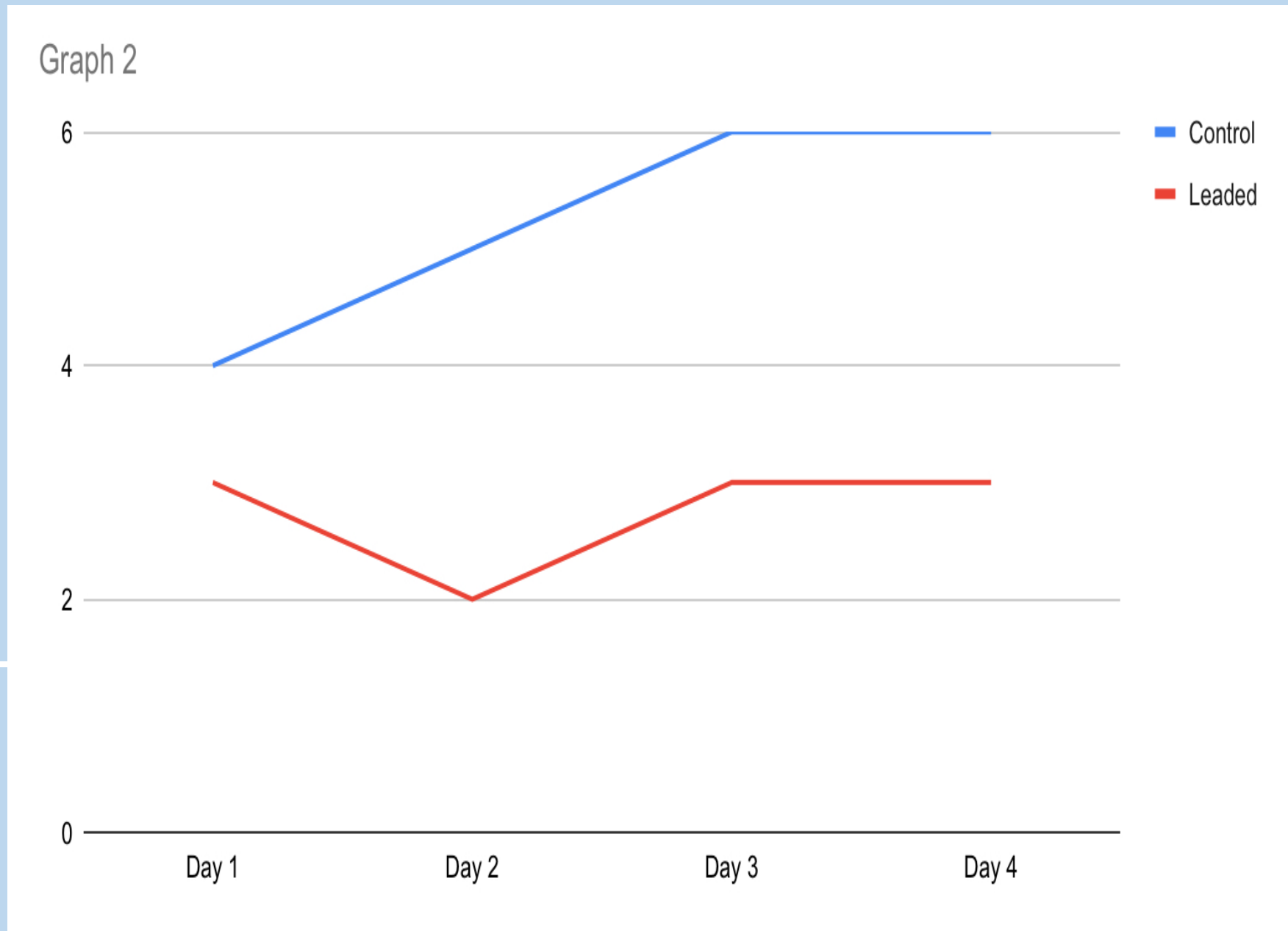
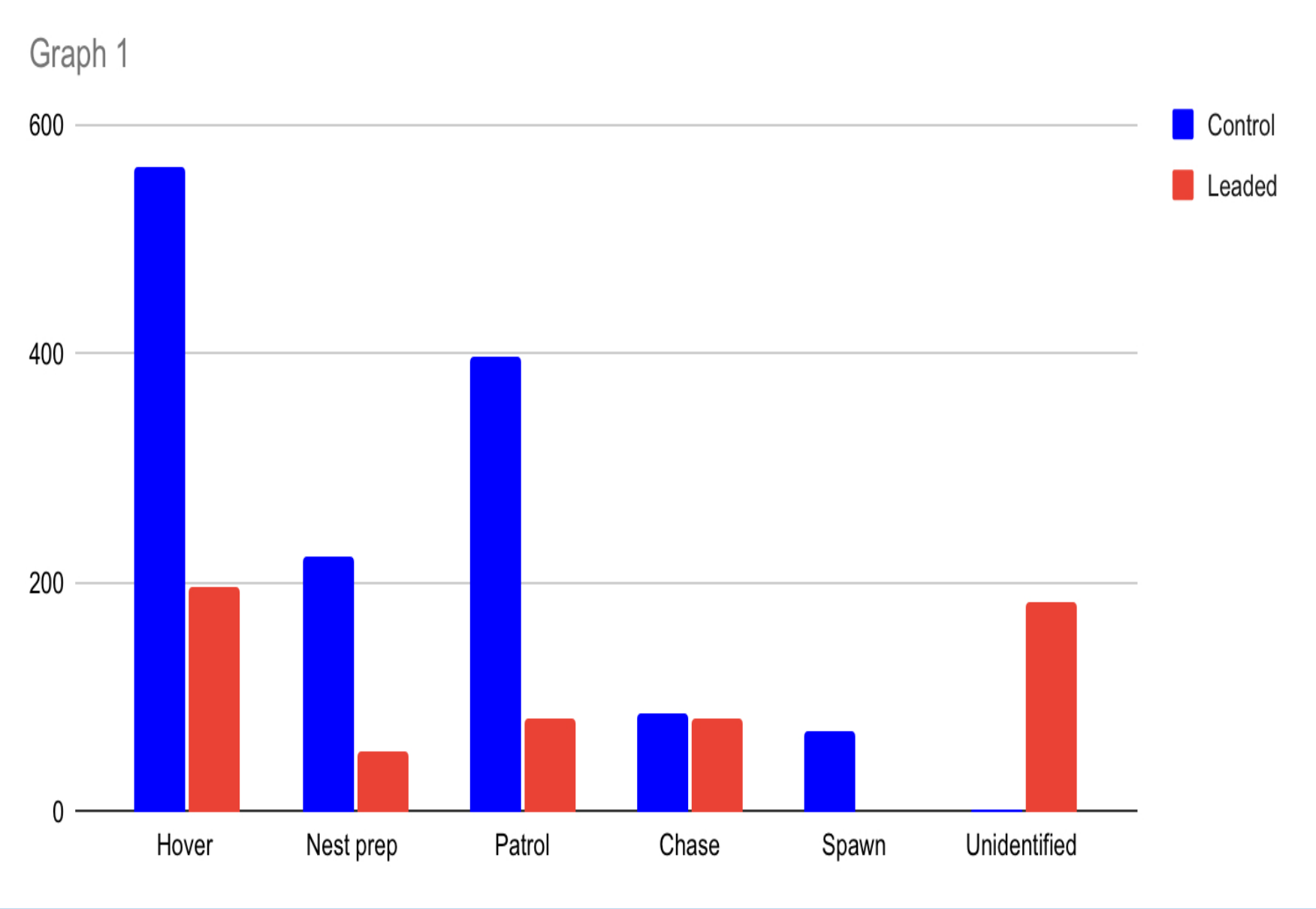
The reason focus was put on to reproductive behaviors was due to the low sex drive found in many species as result of lead poisoning. “Most animal and human studies have shown the effect of lead on the reproductive system. Some studies have shown decline of testosterone.” Says the Iranian Journal of Reproductive Medicine.

Low testosterone levels often come hand in hand with low sex drive. This explains the decrease in leaded fish reproductive behavior, proven significant by the t-chart, and supports the idea that an independent variable, in this case lead, is affecting these behaviors. The great number of outlier behavior in the leaded tank also supports this.

All this said, it can’t be glossed over that the number of chases between both tanks were close. The type of chases however, was very different. Said difference showed the poisoned male’s extreme lack of interest and torment towards the female and consequently indicates low sex drive and aggression towards other fish. Aggression is commonly recognized in other species, including humans, as a result of lead poisoning.

Now focusing on the inattentive ness, hyperactivity, and and lethargy found in the leaded fish, they have both been linked to lead poisoning in children. The American Academy of Child and Adolescent Psychiatry, says, “Even when exposed to small amounts of lead levels, children may appear inattentive, hyperactive, and irritable. Children with greater lead levels may also have problems with learning.”

Perhaps it is the same in minnows explaining why the poisoned tank showed these symptoms.



	Total results
Hover	0.00000001176177499
Patrol	0.000004517567761
Nestprep	0.000004192363496
Chase	0.9368889022
Spawn	0.000000002045405762