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Classical Conditioning and Animal Behavior

As humans we usually associate scents with a memory or a period in one's life, as do animals such as dogs or cats who may respond to a ringing bell or if someone were to shake a bag of dog/cat food, this could associate the ringing bell as a sign that food is here. This example is based on Ivan Pavlov's experiment, Pavlov's experiment demonstrated classical conditioning, a type of conditioning where a stimulus (ringing bell) could trigger a response (a dog starts to drool). This kind of experiment might make one wonder, can an animal be conditioned to a behavior? We will answer this question by including Ivan Pavlov's experiment with his classical conditioning of dogs, stimulus generalization, and a study over classical conditioning in crabs and horses. As well as a designed study to test the plausibility of an animal being conditioned to a behavior.

Ivan Pavlov was a Russian physiologist who discovered classical conditioning by studying dogs. He noticed that dogs would start to salivate when they saw food, but also when they saw or heard other stimuli related to the feeding. These things included bells, or even the sight of a lab assistant. He decided to test this theory by ringing a bell before feeding the dogs. After a while, the dogs would start to salivate by just the sound of the bell without introducing the food into the equation yet. This showed Pavlov that the dogs had begun to associate the sound of the bell with receiving food. The food was the unconditioned stimulus because it made the dogs salivate naturally, while the bell was the conditioned stimulus because the dogs had

learned to react to it. It gave an insight into how animals and humans could learn to associate things and became an important tool in understanding behavior and learning.

In Pavlov's classical conditioning experiment, stimulus generalization happens when a learned response spreads to things that are similar to the original trigger. Pavlov trained dogs to associate the sound of a bell with food, so they would start salivating whenever they heard the bell. Interestingly, the dogs didn't just salivate to that one bell; they also started to react to similar sounds, like a different tone or pitch, even though those sounds weren't directly linked to food. This was showing that the dogs could generalize their learning, responding to things close enough to the original stimulus. Stimulus generalization is a natural part of how we learn and adapt. In Pavlov's experiment, the dogs didn't limit their reaction to just one specific sound; they applied their learned response to a broader range of similar sounds. This ability to generalize is essential for survival; it can help animals and humans respond to various situations that share key similarities. Just like the dogs reacted to more than one bell, we often take what we've learned in one scenario and apply it to others that aren't the same but close enough to trigger the same response. This makes our learning flexible and more useful in the real world.

Furthermore, Ivan Pavlov was the influencer of another animal experiment but only with horses in this study. The experiment was to see if horses have emotions or can show emotions and this is what Ivan Pavlov experimented with, how animals can communicate with humans and give positive or negative feedback based on their environment or owner. In this experiment horses were being trained to know what "blanket on, blanket off" meant and had them make a choice in different types of weather conditions on whether they wanted the blanket on them or not (Jennifer Forsberg Meyer). In results, "On one warm, sunny day, 10 of 22 horses were already wearing blankets, and when asked to choose, all 10 chose the "blanket off" symbol and

on a 45-degree day, 10 of the horses already wearing blankets that day, 10 selected “no change,” not only that, blankets that day, 10 selected the “blanket on” option” (Jennifer Forsberg Meyer). This study shows that animals can have emotions and will show it, with just a little more attention to their behavior when training or just in general.

A study was done with green crabs to test if they could be conditioned, in the study the conditioned stimulus consisted of a mild vibration to the green crab, and the unconditioned stimulus consisted of a puff of air to one of the crab's eyes (Abramson and Feinman). Throughout this experiment, it was found that the crabs were most likely to retract their eyes if they felt both the conditioned stimulus (mild vibration) and the unconditioned stimulus (puff of air to the eye), while other crabs who received either mild vibration alone or air puff alone did not show the same results (Abramson and Feinman). Even after the training was done for the crabs, the conditioned crabs were shown to have a faster start as compared to the first day, the eye reflex was shown to work by only setting the vibration alone and not the air puff to the crab’s eye meaning the crab didn’t have to rely on both stimuli to retract (Abramson and Feinman). This demonstrated that these green crabs were able to respond to a simple stimulus and gave credible feedback to show that crabs can be conditioned and learn a behavior (eye withdrawal reflex).

For our designed study, we will use healthy mice as our animal subject and a high-pitched sound/noise as our stimulus. The question used for this study is: Can an animal (mice) be conditioned to a high-pitched noise? Our representative sample will include a random sample of healthy mice (to prevent any external conflicts with our data and conclusion), around 30 mice will be used for our study, which will give us a strong start in our data findings. Some rats will individually be trained daily to a high-pitched sound and will be given a food item as a way to

train them to associate the pitched sound with the food. The data we will be collecting include: how many mice react to the high-pitched sound without any food given afterward, how many mice respond to the high-pitched sound with food given afterward, and how many mice react to the high-pitched sound as each day passes. The variables for our study include the independent variable (high-pitched sound), the dependent variable (how many mice associate the sound with food), and the controlled variables (what environment they are in and what type of food they are given). Our operational definitions contain the following: neutral stimulus (high-pitched noise), reward (a piece of peanut butter), and conditioned behavior (mice reach for peanut butter after the noise). Our study will ensure that it does not cause any harm to any of the 30 healthy mice. We will follow this by keeping them in a safe environment, keeping the cages clean, giving out fresh food, and ensuring the high-pitched noise isn't painful to their hearing. By the design of this study, we will be able to determine if it's possible to condition mice to respond to a sound.

In conclusion, our study aims to see whether mice can be trained to respond to high pitch sounds by associating it with a reward of food. This will be based on the principles of classical conditioning by Pavlov. We hypothesize that like the horses, dogs, and green crabs, mice could potentially learn receiving a reward through sound. In these experiments we will show how mice react to high pitch sounds alone, how they respond when food is presented, and how these creatures' reactions evolve over time. If sufficient mice react to the high pitch sounds with reward it would show that they have successfully learned to be conditioned with sound for food. We will be building on top of Pavlov's research by ultimately understanding animal behavior. As mentioned before, it would support our hypothesis that conditioning can occur through different species.

References

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