Memory In Goldfish

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Introduction

There is a myth that goldfish only have a three second memory. The purpose of this study was to determine if goldfish were capable of long term memory and the ability to perform higher learning using classical, or Pavlovian, conditioning. To do this, fish will be exposed to light stimulus from a lamp, and then given food. If the fish associate the light with food, then they may swim to the surface expecting food when the light stimulus is applied.

In previous studies, goldfish have been used to test drugs that affect memory, and the effects of lesions on certain parts of the brain have on memory.

Materials and Methods

- 30 Comet Goldfish (*Carassius auratus*)
- 30 individual glass bowls
- Two lamps
- 8”x12” sheets white paper
- Fish food flakes

- 15 fish in control and test groups
- Fish are placed in a group around a lamp, with sheets of paper between bowls to reduce observational learning
- Test Group: Lamp is turned on, five seconds pass in which behavior is observed, and then food is distributed
- Control Group: Lamp is turned on, behavior is observed. Fish are fed at a later time when light stimulus is not applied
- Tests are repeated once daily for a period of 30 days

Results and Discussion

Upon analyzing data, there was a significant increase in fish swimming to the surface immediately when being exposed to the light stimulus. This suggests that the fish learned and remembered that when the light stimulus was applied, they were given food.

At the start of the testing period, nearly all fish would either swim in circles or there would be no movement until the food was distributed. Many fish also demonstrated “surface bubbling” where the fish remained at surface level and bubbled their mouth.

The following is an example of the chart used to determine behaviors. An “X” will be placed in the box indicating which fish performed what behavior.

Behavior	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Surface Bubbling															
Swimming in Circles															
Exploration															
No movement															
Swims at surface level															

Final results concluded that 90% of the fish in the test group immediately swam to the surface upon being exposed to the light stimulus. The control group showed less than 35% consistently swam to the surface upon being exposed to the light stimulus.

Conclusion

Through this study, research concluded that goldfish are capable of retaining long term memory, and the ability to perform higher learning.

The fish responded to the unconditioned stimulus, the light, by swimming to the surface to receive their food.

Future Direction

Future researchers may be able to use the methodology in this study to determine the effectiveness of medications, and the effects of brain lesions, on memory in goldfish, which can be useful for human uses.

References and Acknowledgements

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