



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Gabriel A. Araya</b>	<b>Project Number</b> <b>J2404</b>
<b>Project Title</b> <b>Pavlov's Fish: Do Goldfish Respond to Certain Conditioned Stimuli in Anticipation of Being Fed?</b>	
<b>Objectives/Goals</b> The purpose of this project is to determine whether fish can be conditioned to recognize when they are going to be fed. Question: Do goldfish respond to certain conditioned stimuli?	
<b>Abstract</b> <b>Methods/Materials</b> Materials: 6 Goldfish per trial, 2 (2.5 gallon) rectangular fish tanks, 4 glass divisions with opaque plastic squares to isolate fish, fish flakes, flashlight, a sheet of red construction paper, a bell, pencil and laboratory notebook. Procedure: 1. Fill all six cells up with water. 2. Put a goldfish in each cell (do not kill it). 3. Label each cell accordingly to its stimuli (light, color, bell, vibrations). 4. Confront each fish with its conditional stimuli for ONE minute each, except for two of the fish (control fish), take observations. (conditioned stimuli actions: Flash a light back and forth across (light), surround the bowl with the construction paper (color), ring a bell in front of one (bell), tap bowl with pencil (tap), and do nothing for the last one (control).) 5. Feed each fish (not too much, but the same proportions each.) 6. Make observations after the stimuli (such as moving of certain fins, swimming patterns, or moving of certain body parts like the mouth that do not regularly occur), during them eating, and afterwards. 7. Repeat steps 4-6 for seven more days, once a day each. 8. Do multiple trials.	
<b>Results</b> There was a positive correlation between days passed and occurrence of conditioned responses. Light stimulus fish responded more as days went on. Color stimulus fish responded more as days went on. Tapping and bells worked, but caused stress and killed some fish. Observed responses were flickering of tail, bobbing of mouth, and swimming around in patterns.	
<b>Conclusions/Discussion</b> Light color, and bell stimuli all conditioned fish to recognize when they were going to be fed, especially in the later days. Conditioned responses were wagging of tail, bobbing of mouth, and swimming in circle patterns. Bell and tapping stimuli stressed fish and the stress killed them.	
<b>Summary Statement</b> The purpose of this project is to determine whether fish can be conditioned to recognize when they are going to be fed.	
<b>Help Received</b> My father helped me set up the aquarium. My mother helped me cut the typed report.	