



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Caroline K. Salmond</b>	<b>Project Number</b> <b>S2015</b>
<b>Project Title</b> <b>A Goldfish Never Forgets: Year Three</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Do goldfish contain long-term memory capabilities, or the ability to remember an event or occurrence, when put under the temperate effect of warming waters through operant conditioning? If I operantly condition eight common, household pet goldfish to associate a certain colored ring with a food reward, and then test them under different water temperatures, they will demonstrate faster recognition times in the cooler water than in the warmer water.</p> <p><b>Methods/Materials</b> The materials needed for this experiment were: Eight (8) common goldfish, one (1) twenty-gallon aquarium, a filter, an aquarium heater, an aquatic thermometer, a light and tank covering, fish food (flakes), a stopwatch, three (3) Styrofoam rings, one tub, and one camera.</p> <ol style="list-style-type: none"><li>1. Acquire eight common goldfish.</li><li>2. Feed goldfish daily in seventy-degree water using three colored rings (red, yellow, and blue). Place food in red ring so that fish will eat out of red ring.</li><li>3. After several days of training the fish, test fish in tub with seventy-degree water. Place the three rings at the opposite end of the tub and record how long it takes each fish to recognize and swim to the ring (test each fish individually).</li><li>4. After two tests, change tank temperature to eighty degrees and continue feeding using training method with rings.</li><li>5. After several days, conduct two more tests in tub, this time with eighty-degree water temperature. Record time it takes for fish to recognize and swim to rings.</li></ol> <p><b>Results</b> Fish were slower in warmer water tests compared to cold water tests.</p> <p><b>Conclusions/Discussion</b> My conclusion is that the goldfish have better memory and recognition skills in the colder water. I believe this is true because in warmer water, goldfish have higher respiration rates, which means they require more energy. This would slow down their overall swimming.</p>	
<b>Summary Statement</b> The purpose of this project is to continue my study of the long term memory capabilities of a common goldfish and to determine if these capabilities are affected by differing water temperatures.	
<b>Help Received</b> Mother helped maintain fish tank.	