



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sophie H. Klimcak</b>	<b>Project Number</b> <b>S2009</b>
<b>Project Title</b> <b>Electric Fish Language: Communication through Electric Fields</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The Black Ghost Knifefish (BGK) is a nearly blind, weakly electric fish that produces and detects electric fields in order to both locate prey and communicate with mates during courtship rituals and aggressive rival interactions. In this project, I attempted to teach this fish a two word electric field language that would enable me to control the movement of the fish between two regions of an aquarium. <b>Methods/Materials</b> Using a standard conditioning method with food as the positive reinforcer, I trained a test fish to swim through a hole in a dividing wall of an aquarium into a 2nd chamber when I applied a specific type of electric field pulse to the aquarium. To do this I used a computer sound card, pulse generation software, and a pair of submersed electrodes. I trained the same fish to remain in its original chamber when a different type of electric field pulse was applied. A similar control fish was trained to always remain in the original chamber when either type of pulse was applied. <b>Results</b> I had hypothesized that I could successfully communicate with these fish and control their swimming behavior, making the test fish either stay or swim out of the chamber depending upon the type of pulse that I applied. My initial results did not verify this hypothesis. I surmised that this failure was due to a poor training method. I am continuing this experiment at the present time with an alternative training method and will present my latest results at the State Science Fair. <b>Conclusions/Discussion</b> My initial experiments did not support my hypothesis that this fish is capable of recognizing and responding appropriately to the type of electric field pulse that is applied. At the time of abstract submission I do not have adequate data with my alternative approach to reach a definite conclusion on its cognitive ability.	
<b>Summary Statement</b> I tested whether the Black Ghost Knifefish could use its electrolocation sense to distinguish between two different electric field waveforms, a capability that would enable me to communicate with the fish and control its movement.	
<b>Help Received</b> I would like to thank my father for showing me how to measure the fishes electric field. I would also like to thank Robert Farley who told me about the Black Ghost Knifefish several years ago and got me interested in doing experiments with them. Finally, I thank Dr G. Emde and Dr. Brian Rasnow.	