



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) William A. Strober	Project Number J0833
Project Title Acceleration by Magnetic Forces and a New Propulsion System	
Abstract Objectives/Goals To determine what the direction of the lines of force would be if you could get inside an electromagnet with a north pole on the left end and a south pole on the right end. Are the forces in the same direction as the forces on the outside of the electromagnet? To determine if a new propulsion system could be designed based on my observations. Methods/Materials With a hollow electromagnet that I built, and a natural magnet, I performed several experiments. I placed the natural magnet in various positions in relation to the north and south poles of the electromagnet. These included putting the natural magnet in the center of the hollow tube of the electromagnet, and putting the natural magnet on the outside of the electromagnet with different poles of the natural magnet facing the different poles of the electromagnet. Results The south pole of the natural magnet was attracted to the north pole of the electromagnet and the magnet shot into the hollow tube of the electromagnet, and stopped in the center. The same happened when I placed the north pole of the magnet next to the south pole of the electromagnet. When in the center, the magnet resisted when I tried pushing it to either end. Thus, it was repelled by either end. When I tried putting the magnet's north pole into the electromagnet's north pole, it repelled. After I forcefully pushed it in, it would stay in the center, but shot out the south pole when pushed slightly further toward the south pole. However, when I pushed the magnet from the center in the opposite direction toward the north pole, it then shot out of the north pole. Thus, it was attracted by either end. Conclusions/Discussion To my surprise, the inside and outside of one end of the electromagnet behaved as north poles, and the inside and outside of the other end behaved as south poles. I also designed a new propulsion system for maglev trains or subways, since when the natural magnet shot into one end of the electromagnet, and I reversed the flow of electricity when it got to the center, it shot out the other end. Trains could be propelled this way through a series of hollow electromagnets.	
Summary Statement This project is about exploring the direction of magnetic fields inside and outside of electromagnets.	
Help Received Father provided information for switches, helped in handling during experiments, and helped in editing.	