



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Oliver H. Lorenz</b>	<b>Project Number</b> <b>J0718</b>
<b>Project Title</b> <b>The Power of the Force: An Investigation of Electromagnetic Field Forces</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project was to learn how electromagnets work and to determine if the number of wraps in an electromagnetic coil proportionally affects the strength of the electromagnetic field.</p> <p><b>Methods/Materials</b> Copper wire was wrapped around iron nails to create coils with 50,100, 150, and 200 wraps. Electromagnets were created when each coil was attached to a 12-volt battery. Each magnet was tested fifteen times to see how many washers it could lift.</p> <p><b>Results</b> The more wire wraps on the magnet the more washers it lifted. The average washer lifted per wrap was consistent except for the 50-wrap electromagnet, and the nail with 200 wraps lifted the most washers. For some reason the magnet with fifty wraps averaged only 0.04 washers per wrap. The others more than doubled this average and averaged 0.09 washer per wrap, which indicates that it is proportional. The charge of the battery may have had an impact but I think it is unlikely. The electromagnets didn't pick up large amounts but adding more wraps made the electromagnet stronger.</p> <p><b>Conclusions/Discussion</b> Increasing the number of wire wraps around an iron core proportionally increases the strength of the electromagnet's power.</p>	
<b>Summary Statement</b> My project was to determine whether the number of wraps in an electromagnetic coil proportionally affects the strength of the electromagnetic field.	
<b>Help Received</b> Father and Grandfather helped with electromagnetic concepts, Stepmother proofed board and report.	