



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jeannie J. Lee</b>	<b>Project Number</b> <b>S1111</b>
<b>Project Title</b> <b>Does Age Affect the Time It Takes Cone Cells to Fatigue?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The object of this experiment is to determine whether age affects the time it takes for cone cells to fatigue. When an image strikes the retina, cone cells absorb the colors of the given image. After exposure to a colored image for a prolonged period of time, the cone cells become fatigued. Because of this, the cells can no longer respond to those colors, and, therefore, substitute the opposite color. This phenomenon is called retinal fatigue, and what is seen is an afterimage. My experiment will prove whether age is a factor in the duration of retinal fatigue.	
<b>Methods/Materials</b> 1. Ask the test subject to focus on one of the given images for 30 seconds. 2. Test subject should shift his or her gaze from the image of a colored bird to the image of an empty cage, in which he or she will see an afterimage. 3. Time how long the test subject sees the afterimage. 4. Repeat this process for each of the three different colored images.  - random sampling of 50 test subjects (25 test subjects who are 40 years old or younger & 25 test subjects who are older than 40 years) - three 6x6 inch white foam boards with 2x2 inch red, blue, and green colored silhouettes of a bird on each  - 6x6 inch white foam board with a drawing of an empty bird cage - stopwatch	
<b>Results</b> For Group 1 (younger group), M-cones (green) were fatigued for 7.65 seconds; L-cones (red) were fatigued for 11.23 seconds; the S-cones (blue) were fatigued for 11.29 seconds. For Group 2 (older group), M-cones (green) were fatigued for 12.51 seconds; L-cones (red) were fatigued for 16.77 seconds; S-cones (blue) were fatigued for 15.09 seconds.	
<b>Conclusions/Discussion</b> The results of my experiment proved that there is a correlation between the fatigue period of cone cells and age. The cone cells, including all three types, of older people are fatigued for a longer period of time than that of those who are younger. Specifically considering the periods of fatigue for the three cone cells, the M-cones (green) were fatigued for the shortest period of time for both the young and the old compared to the other cone cells.	
<b>Summary Statement</b> The object of this experiment was to determine if age affected the period of retinal fatigue; the results of The Bird in a Cage test proved that older people have a longer duration of retinal fatigue than those who are younger.	
<b>Help Received</b> Dr. Steven Yoo, my optometrist, helped me set up the testing methods.	