



**CALIFORNIA STATE SCIENCE FAIR  
2004 PROJECT SUMMARY**

<b>Name(s)</b> <b>Daisy Zhou</b>	<b>Project Number</b> <b>J0341</b>
<b>Project Title</b> <b>Subjective Contours</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Subjective contours are nonexistent lines that can be perceived. My problem was to find the maximum percentage of homogeneous white area over the total area of one side of an equilateral figure that still sustains a subjective contour. I hypothesized that contours can be perceived when the percentage of homogeneous area is less than or equal to 75%, since many of the designs I have seen had inhomogeneous areas of at least <math>\frac{1}{4}</math> the total area.</p> <p><b>Methods/Materials</b> My experiment consisted of two designs formed by subjective contours, a triangle and a square, both found in the book <i>The Perceptual World</i>. On the computer, I created 10 cases of different percentages in homogeneous areas for the triangle design and 8 cases for the square. I used the cases to test 25 people and recorded which case they began to perceive the subjective contours (cases go from most homogeneous area to least).</p> <p><b>Results</b> The results for each of the 10 triangle cases were 0, 1, 2, 5, 4, 11, 0, 2, 0, and 0 people at 98%, 94%, 90%, 78%, 65%, 56%, 54%, 46%, 36%, and 23%, respectively. The most number of people (11) began to perceive the lines at 56% in homogeneous area. For the square design, which had 8 cases, the results were 1, 4, 2, 4, 3, 7, 4, and 0 people at 97%, 95%, 94%, 91%, 87%, 75%, 60%, and 33%, respectively. The most number of people occurred at 75%, with 7 people.</p> <p><b>Conclusions/Discussion</b> Using the results stated above, I conclude that there is a threshold, or a maximum percentage of homogeneous area, for perceiving subjective contours. However, that threshold varies according to the shape of the figure formed by the subjective contours. The thresholds for the triangle and square are 56% and 75%, respectively. The findings can be applied to many computer vision based problems, such as detection of lanes on highways and recognition of partially obscured objects.</p>	
<b>Summary Statement</b> Finding the maximum percentage of homogeneous white area over the total area of one side of an equilateral figure that still sustains a subjective contour.	
<b>Help Received</b> Teacher reviewed report and display board; Schoolmates participated in experiment tests.	