CPSC 4040/6040
Computer Graphics Images

Assigned: 9/8/2021
Due: 11:59pm, 9/17/2021

Programming Assignment 2 — Albers Color Studies *(Grading: 0–10 points)*

Problem Description

The artist Josef Albers made the interaction of color the focus of his art and teaching. He called this *simultaneous contrast*. The key idea, is that the perception of color is a relative or contextual phenomenon. In other words, the color we perceive is highly dependent upon the surrounding colors. Albers developed a number of problems that he presented to his students to develop their understanding of color interaction. One of these is the *Three Color Problem*. The idea is to make three distinctly different colors look like two ("three-to-two") or four ("three-to-four"). This assignment is simply to give you some experience with this concept, by encouraging you to experiment with how colors can be "shifted" by other colors.

Basic Requirements

You should download a program called `albers` from the website. Unzip the file, and type make. The program should compile and the executable program will be named `albers`. When you run this program, it gives you an interface to use to do the *Three Color Problem*. Two colors are used as rectangular fields and placed in the background next to each other. In the middle of each field is a small shape of the third color. In the "three-to-two" variant, you should choose the three colors such that the color in the middle of the left field looks like the color of the right field, while the same color in the middle of the right field looks like the color of the left field. In the "three-to-four" variant, the idea is to choose the three colors such that the color in the middle of the left field appears different from the color in the middle of the right field, thus creating the illusion of four different colors.

You can interact with the program via the menu (right mouse click). When you have a solution you like, save your image to an image file and save the "project". You can reload a saved project for further experimentation. *You should complete at least* **two "three-to-two" and two "three-to-four" color problems.** As soon as you are satisfied with your results, submit a report consisting of your four saved images and the corresponding values of the colors that you used. You should also upload your saved images. There is no need to submit any code.

Advanced Extension

Modify the code in the program to support setting the color of the right and left small shapes independently. This is a minor change; you'll need to allocate storage for the additional color in the `Project` class and draw the mirrored shape using this additional color in the `Display` function of the `main.cpp` file. You must also modify the interface so that you can control this color. There is no need to submit the code.

After making the changes, you need to experiment with a "four-to-three" color problem. This is the problem where you try to make four colors appear like three. Thus, instead of having identical foreground colors appear differently in the left and right, your task is to have different colors appear identical. This can be achieved by carefully selecting a different color for the left and right foreground shapes and adjusting the background colors accordingly. You should give **at least two examples of the "four-to-three" color problem.**

Submission

For this assignment you should turn in your saved images along with a report. The report should be either an html file or a pdf file, and should include your name, images of the best of the solutions that you generated, and the components of the colors that you used. If your report is in html format, be careful not to use absolute paths in your html code. You should zip the report and saved images and upload it to the `Canvas` submission system.

Help

If you get stuck, please do not hesitate to contact us for help, and stop by during office hours. We also encourage you to post questions and initiate discussions on Canvas. Your colleagues are also there to help you.