Task 1 - Find your blind spot

In the test we are presented with an X and a circle, when our face was centered with X and close our right eye, on a certain distance we can't see the circle anymore. There's a range for such distance where we can't see the circle, corresponding to the blind spot range.
Also we found in the following tests that the brain has the ability to fill in the gap caused by the blind spot, even when the background has complicated patterns, it's like a inner built Photoshop for all of us!

Task 2 - Ishihara Colour Test

numbers: 74, 6, 16, 2, 29, 7, 45, 5, 97, 8, 42, 3

Task 3 - Reverse colour

When we stare at the pic and then looking at a white surface, it reveals the flag in its normal colors (red, white, and blue)
It can be explained by the opponent-process theory of color vision.

According to this theory, certain cells in the retina and the visual pathway are excited by one color and inhibited by its opponent color (red and green in this case). These cells are known as opponent cells.
When we stare at the American flag in green and yellow for 10s, the cells in our eyes that respond to green (opponent to red) and yellow (opponent to blue) become fatigued or adapt to this stimulus. This means that the green-sensitive cells and yellow-sensitive cells reduce their response.
Then we immediately stare at the white sheet of paper, the white light contains all colors of the spectrum. But our green- and yellow-sensitive cells are temporarily less responsive, so the red and blue appears more vivid with less inhibition.

Task 4 - Troxler's Fading

Toxler's fading: When one fixates on a particular point for even a short period of time (around 20 seconds), stimuli in your peripheral vision will fade away and disappear.
It works better when the stimulus is blurred, small and of low contrast.
For the experiment:
1. The moving blank space turns into a green spot
Similar as task 3. When we stare at the lilac-colored spots, the photoreceptors (cones) in your eyes that are sensitive to red and blue light become temporarily fatigued. When a spot disappears and is replaced by the blank space, fatigued cones do not respond as strongly and causing imbalance, so green appears more vivid with less inhibition.

2. Spots disappearing
Then when we keep staring at the cross, the lilac spots in our peripheral vision start to fade

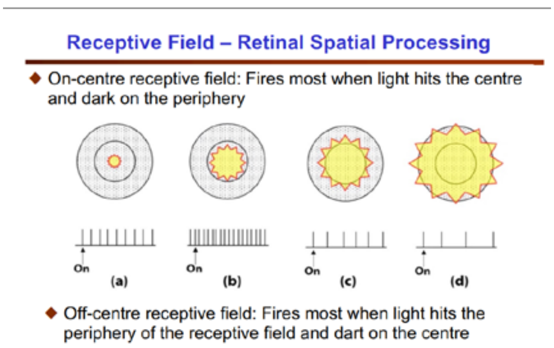
and disappear one by one. The peripheral neurons in our visual system start to adapt and reduce response from the spots, leading to the fading.
Because there is a moving space, it possesses difference on the exposing time of each cell to the spot, so each region starts to fade the response one after the other.

3. The blue ring disappeared after staring at the center red dots, for the same reason explained above

Task 5 - Brain sees what it expects

The blue table looks longer and narrower, but after measuring they are the same, and the illusion does not change without the color.
This is caused by human brain's perception of 3D space from the given image. Our brain would subjectively expands the near-far dimension along the line of sight. As a result, one "table" seems long and narrow, with its longer dimension receding into the distance. The other "table" looks almost square, because we interpret its shorter dimension as foreshortening.

Task 6 - The Grid Illusion
The two most common types of grid illusions are the Hermann grid illusion and the scintillating grid illusion.(presented in the task).
The effect of this illusions can be explained by a neural process called lateral inhibition. The intensity at a point in the visual system is the result of a group of receptors which respond to the presentation of stimuli in what is called a receptive field.
In the center of the receptive field, while the individual photoreceptors excite the ganglion cell when they detect increased luminance; the photoreceptors in the peripheral area inhibit them. When we stare at the intersection it's surrounded by 4 white lines which provide even stimulation for both the center and peripheral area of the field, giving a typical level of neuronal activity and we perceive it as a normal white grid section, but for the white lines between the intersections. The center of the receptive field is still on a white part, but the surround falls more on the black lines. So, the cell fires more strongly and the white line looks brighter, causing the other intersections looks greyer in comparison. (edge enhancement)



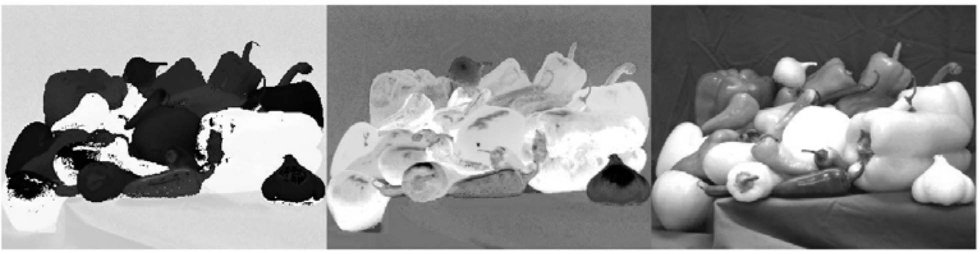
Task 9 - the Incomplete Triangles

We saw a white up-side-down triangle that wasn't suppose to be there, with a illusional contour framing it out. Objects in the natural world are often only partially visible. Illusory contours provide clues for how the visual system constructs surfaces when portions of the surface's edge are not visible.

Task 10 - Convert RGB image to Grayscale

Task 11 - Splitting an RGB image into separate channels

Task 12 - Map RGB image to HSV space and into separate channels



ask 13 - Map RGB image to XYZ space

There’s a slight difference between the two pic form different color spaces. The color differences between images in RGB and XYZ color spaces are primarily due to the different ways these spaces represent and interpret colors. RGB is designed for electronic displays and is device-dependent, meaning colors can vary across different devices. XYZ, on the other hand, is a device-independent color space based on human vision and can represent a broader range of colors. When converting between these spaces, some colors might not translate perfectly due to differences in gamut and the color processing algorithms, leading to noticeable color differences.