

# How Anaglyphs Work

In the Action Menu of the Polyhedral Category one finds **Show Anaglyph Demo**. Selecting this starts up a graphic demonstration that attempts to explain pictorially the ideas behind the anaglyph stereo rendering of 3D objects. One sees a diagram showing how the currently selected polyhedron is being projected from two different viewpoints (the left-eye and right-eye viewpoints). In more detail:

*Step 1.* Viewed through red-green glasses one sees:

- (i) the current regular polyhedron in front of the screen,
- (ii) one projection center, even further in front of the screen, and three projection rays,
- (iii) the projection of the polyhedron onto the computer screen.

If one takes the glasses off, then everything which appeared to be in front of the screen is drawn twice, one copy in red, the other in green. The projected polyhedron is drawn once in yellow. The red-green glasses are filters, and the yellow color passes through both of them, while the red color passes so poorly through

the green filter that it cannot be distinguished from the black background, and similarly, the green color cannot be seen through the red filter.

*Step 2.* Now, with the red-green glasses on, press the *Right Arrow Key*. The result is that a second projection center and the corresponding second projection is added to the 3D-image. Because the second projection is again colored yellow, one sees it as a second projection on the screen. (Note that while *Mouse Rotation* of the polyhedron is enabled, the projection centers remain fixed.)

*Step 3.* Finally, again with the red-green glasses on, press the *Left Arrow Key*. While it is pressed, the colors of the two projected images get changed: one turns red, the other green. Our brain interprets this immediately as a three dimensional object. It is some sort of polyhedron, but looks rather different from the projected one. If one moves ones eyes to the vicinity of where the projection centers appear to be, then this distortion gets less. Note that the original polyhedron now shows some distortion because the red and green images were computed under the assumption that the viewer looked orthogonally down onto the screen. – Press and release the *Left Arrow Key*

repeatedly! The impression is somewhat stronger if one kicks the polyhedron with the mouse so that it keeps rotating.

*Step 4. Other Mouse Operations* are also enabled:

By pressing SHIFT one can scale the whole image, including the projection centers.

By Pressing CONTROL one can move the polyhedron with the mouse in the two directions parallel to the screen, with the projection centers remaining fixed.

By Pressing SHIFT + OPTION one can move the polyhedron vertically, to and from the screen (Mouse movement in y-direction). One can thus study how the projected images change if one changes the relative position of the polyhedron to the two projection centers – and how the shape of the object varies which our brain reconstructs from the two changing projections.