

## **The Pinball Wizard Illusion**

The impression of rotation seen in this illusion is brought about through the seemingly implausible device of a texture placed in the image that can be interpreted simultaneously as background and foreground. In the illusion the spheres do not rotate as they traverse across the window. The sense of rotation is induced by the careful choice of colour values and transparency for a texture added to the animation and by the accentuation of depth using a variety of depth cues in the artwork. In this latter respect the horizontally traversing red spheres are shaded to enhance their spherical appearance and their speed and diameter has been adjusted to imply a sense of perspective. The spheres are stacked in layers so that those 'in front' can obscure those further away and an atmospheric haze effect has been added to makes more distant looking objects appear less distinct. Lastly, a less well known depth effect has been added to the animation whereby darker backgrounds tend to enhance the impression of depth. The background luminance (which is adjustable) has initially been set to optimise the depth impression using the results from a set of observational studies. Taken together these depth cues create a convincing three dimensional impression that is important to the illusion.

Having established the sense of depth, the key to the illusion then lies in the manipulation of the figure ground relationships so that a texture is made to belong to both foreground and background. This is achieved by placing a texture image with high transparency (20%) and carefully chosen colours and patterning, in a layer in front of everything else. The design task has been to make this texture appear as background where it is not sharing space with the spheres and to appear as part of the foreground where that space is shared.

As a sense of depth has already been created in the animation, the hazy colours of this texture are seen not in front but behind the spheres as a background. However, where the texture interacts, its colour properties change as the colours combine with those of the underlying spheres. This makes the patterning seem to be part of spheres as the red component effectively disappears leaving only the blue component visible but now of a different hue (grey). This is quite different from the background giving it the appearance of a surface texture on the spheres. Moreover, as the spheres move horizontally this 'surface texture' that visibly travels across the spheres slips away indistinctly at the edges as the colours there revert to those of the background. Thus instead of seeing horizontal motion the mind induced into seeing the texture as belonging to the spheres sees the motion not as linear but as rotation.