



From Flat to 3D

an industry op-ed by Steve Wright

3D (stereoscopic) movies are exploding in popularity but it may come as a shock that many of them are not actually filmed in stereo. Even some cgi films that are already 3D productions are filmed flat then later converted to 3D. Shooting live action in stereo is fraught with so many problems and additional expenses that many film makers avoid it like the plague. The answer is increasingly to shoot the movie flat then convert it to 3D in post-production.

In early September I was invited to In-Three in West Lake Village, CA, to conduct some special training for the compositing staff to help with their extraordinarily difficult keying problems. In-Three is a leading post-production studio specializing in the conversion of movies that were originally photographed flat into high quality stereoscopic 3D features. While I have a basic background in stereoscopic compositing the process at In-Three is unique because it is based on their proprietary in-house software. As a result I was treated to a grand tour of their entire operation plus a close look at their custom software including a demonstration of their workflow.

What struck me most about this intriguing process was how incredibly detail-oriented and labor intensive it is. Each item in the frame that is at a different depth must be isolated with a roto mask then assigned a “disparity” offset to shift it over to add the parallax that creates the perception of depth. And these masks cannot be just flat shapes. Otherwise it would look like the characters were all printed on flat cardboard cutouts. The shapes must also be contoured to give them an appropriate bulge towards the camera in order to give them a natural roundness. Some elements are too complicated and fine (think frizzy hair) to draw a roto or to paint so they must somehow be isolated with a key.

Once the production team has created all of the roto masks, keys, and other elements for a shot it then goes to a new specialist in the movie making business, the “stereographer”. Like a colorist makes color grading decisions to artistically enhance a film, the stereographer makes depth grading decisions crucial to the storytelling, not to mention viewer comfort. The stereographer makes adjustments to the left and right eye offsets of each element in the shot to introduce the desired amount of parallax. What is not so obvious is that there are also a number of very technical issues that must be addressed when depth grading a film.

One of the inherent limitations in any 3D film projection are the issues of convergences and focus. In the real world our eyes change both convergence and focus when looking at near and far objects. In the projection of a 3D movie the focus is fixed at the screen while the convergence changes. This is a

fundamentally unnatural act which must be well understood and controlled by the stereographer to avoid giving the entire audience eyestrain and migraines. Here are just some of the considerations the stereographer must keep in mind when depth grading a 3D feature:

- The Dash Board Affect - named for quickly moving your eyes from the dashboard of your car to the road in front, when the object of interest snaps from near to far (usually due to a cut) the viewer gets disoriented.
- Depth Matching - making cut-to-cut adjustments so that the depth change on the item of interest is not too dramatic. This is done to avoid the Dash Board affect.
- Floating Window - when an object with significant parallax hits the side of the frame one of the eyes loses depth information which can then cause the object to appear to float off the screen.
- Child's Interpupillary Distance - this is the distance between the pupils of the eyes and it determines our perception of parallax. It is 25% less for children, so this difference must also be taken into account.
- Miniaturization - when objects appear miniature because the parallax is incorrect.

The stereographer actually sits with the director and depth grades the feature just like a colorist does when color grading. One of the great advantages of converting a flat film to 3D rather than shooting it in 3D is the addition of this depth grading step. If the film is originally shot in 3D the parallax is locked in and there is no opportunity to change it in post. And what director doesn't want to change things in post? With the studios sitting on literally thousands of archive movies that were shot flat there is a rich future for talented companies like In-Three that can take a flat movie and convert it to high quality 3D.

Steve Wright

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<http://www.in-three.com/>