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—Phil "Captain 3D" McNally
Stereoscopic Supervisor
DreamWorks Animation SKG

The Way of the Weird

DreamWorks Animation SKG Uses Maya and Lustre to Bring a Brilliant Cockroach, Blue Blob, Missing Link, Immense Insect, Gigantic Woman, and Stereoscopic 3D to Monster vs. Aliens

Summary

It's still the same old story. Boy meets girl; girl gets hit by toxic meteorite, instantly grows to 49 feet 11 inches tall, meets weird monsters, and saves world from alien invasion. Well, that's the story behind Monsters vs. Aliens anyway, the latest animated film from DreamWorks Animation SKG. Monsters vs. Aliens is the first DreamWorks film to be completely authored and produced in stereoscopic 3D, and it will certainly not be the last. DreamWorks CEO Jeffrey Katzenberg has already let it be known that all future DreamWorks films will be made this way. To hear Stereoscopic Supervisor Phil Captain 3D McNally (we know…but that is the full name on his California driver's license) and Production Designer David James tell it, means Autodesk® Maya® and Autodesk® Lustre® software will have prominent roles in the DreamWorks production pipeline.

Challenge 1: Creating in 3 Dimensions

"Authoring in 3D is entirely different from creating 3D in post," says 'Captain 3D' matter-of-factly. "When Jeffrey Katzenberg made it clear that 3D authoring would be a top priority for DreamWorks future projects, we knew we had to figure out which tools we'd need for future projects."

To determine their future tools, the DreamWorks Animation team looked to their not-too-distant past. A particularly action-packed sequence from the Academy Award®-nominated Kung Fu Panda (2008) was unearthed and reauthored using stereoscopic 3D. Says McNally: "We literally had to go back to the drawing board and reinvent how it

would have looked if it had been authored in 3D. We then made comparisons between the two versions in order to plan our approach to Monsters vs. Aliens. We also knew that, to create this way in 3D, it was absolutely essential that our artists be able to see exactly how things should look in 3D space. The only place we can do that is inside Maya."

A challenge more specific to Monsters vs. Aliens, however came with the multitude of tricky characters that would need to be fully authored in 3D. McNally explains: "If you want a character to look really good in 3D, to not appear as cardboard cutouts or overstretched freaks, you need to give them just enough room to maneuver without overwhelming the viewers' senses. With 3D lenses that are perhaps 35 mm long, you often run into situations where you need a great deal of depth to make the characters look round and realistic. That depth can become very uncomfortable to the normal human eye."

If this all sounds like a lot of work to make sure audiences receive every conceivable angle of a brilliant cockroach, a blue blob, a missing link, an immense insect, and a freakishly tall woman, bear with us. You'll soon see that stereoscopic 3D (S3D) isn't just for sight gags anymore. Authoring for S3D is making the medium evolve into a fully fledged storytelling tool, and when S3D serves the story, it will be generally accepted by audiences and, in this business, when something is accepted, it's expected.

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Autodesk Lustre helps us look at the entire lighting, color correction process, and S3D transitions holistically, and then make radical and significant changes in real time. It is without a doubt the best tool that I have ever had access to.

Challenge 2: Lighting in 3 Dimensions

The challenges of 3D authoring are slightly different for DreamWorks Production Designer David James than they are for Captain 3D, but no less daunting. Don't forget that this is, in many ways anyway, a new way of working:

"It's like camera, action, lights!" says James succinctly. "In our production pipeline, we effectively shoot the movie before we light it. We do lots of set planning and other preparations to ensure we have a pretty good idea of where we're going, but the lighting process is an amazingly involved creative, technical, and iterative process, requiring a great many lighting teams to get the job done. Our lighting teams really have to act as high-end compositors, technical directors, and digital lighters when all is said and done. With so many different people working, there are frequently shot-to-shot lighting disparities. Fortunately, we have Autodesk Lustre, which helps us look at the entire lighting, color correction, and the S3D transitions holistically, and then make radical and significant changes in real time. It is without a doubt the best tool that I have ever had access to."

Solution 1: Autodesk Maya

As much as they like their Autodesk tools, however, McNally and James have both taken a decidedly hands-on approach to getting precisely what they need out of Maya and Lustre, respectively. Says McNally:

"We've developed tools in Autodesk Maya to measure distances in a scene and then translate those distances into pixel separation, which is how the stereo effect is created in the theater. We use a multi-rig system, where we're able to treat the primary character in a shot individually, giving it the full stereo effect for realistic volume and look, but dialing back the stereo on other peripheral characters."

McNally continues: "So, we set up one stereo rig for our main characters, another for more peripheral characters and elements, and maybe even a third rig for foreground elements, and composite it all together into a scene that is both realistic and manageable to the human eye. Again, to set all of that up, we need to be able to see exactly what we are doing in 3D space. It's like, if you want to drive a car, you need to be able to see outside the car windows as you're doing it. This is information we need to know before we render. The only place we can do that is inside the 3D viewer in Autodesk Maya. We can manipulate on-the-fly and animate elements as well as we go along."

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More specifically, the radically differing size of the soon-to-be-beloved characters in Monsters vs. Aliens meant many of the challenges facing McNally's team involved relative perspectives:

"The main challenge on the film has been one of scale," says McNally. "I mean, our main character is a 49-foot 11-inch woman, Ginormica, and another is a 350-foot insect. When you consider that the rest of the characters are pretty much normal size, you can see that composing over-the-shoulder shots with such immense characters will be a challenge. In the end, however, 3D added a nice dimension to those shots. There's a scene between Ginormica and her normal size boyfriend, for example, that gave us the opportunity to really use the Stereoscopic technique to move her back into the screen, while having the boyfriend more out in the personal space of the theater. That scene is a perfect example of how 3D can really amplify whatever is going on in a scene."

Solution 2: Autodesk Lustre

Separating out elements for special attention is also very important for James and his production design team. With large lighting teams, iterative processes, and often daunting schedules, it is all but inevitable that there will be a wide variety of lighting treatments to both characters and scenes. The teal-blue, viscous character of B.O.B. (short for Bicarbonate Ostylezene Benzoate), for example, is described by James as essentially "a collection of the physics of light" holding seven or eight completely separate rendering qualities and layers within his jiggly recesses.

"With the four channels available in Autodesk Lustre, we can isolate characters, backgrounds, matte paintings, and visual effects," says James. "We can easily add shadows, perform color correction, and add visual depth or the perception of atmosphere. It's not just pulling a key off of luminance or a color; we can actually work entirely within a matte. We can work with an entire sequence of an animation, all at once and in real time, going shot by shot through the sequence to adjust inconsistencies in the backgrounds and characters. In Lustre, the inconsistencies can be corrected almost as quickly as I notice them. That is incredibly valuable, especially in stereoscopic work."

James also uses Lustre to remove stereoscopic "ghosting," an issue that occurs with stereoscopically deep shots employing a great deal of contrast, and where the individual left and right viewpoints leak light into each other. Using Lustre, a supplementary matte can be inserted behind the areas where the ghosting is most pronounced.

The Result

Now that Monsters vs. Aliens' has released, you might expect that "Captain 3D" McNally and "Dr. Color" James to be putting away their tights and capes for a bit, but alas, there is no rest for the talented, even in a challenging economy. DreamWorks CEO Jeffrey Katzenberg announced that all the company's animated films will be authored in 3D going forward, which means plenty more work for people like Phil and David. DreamWorks Animation SKG is already at work on How to Train Your Dragon and Shrek Goes Fourth, both of which will draw all of us closer still to a much deeper experience at our local theaters. And no matter what happens along the way, Autodesk Maya and Autodesk Lustre will be there to help out.

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