This April DreamWorks Animation will release its long-awaited new feature, *Monsters vs. Aliens*. Directed by Conrad Vernon and Rob Letterman and featuring the voices of stars including Reese Witherspoon, Hugh Laurie and Seth Rogen, *Monsters vs. Aliens* is the first animated film to have been authored in 3D, as opposed to having had 3D effects added in post-production as is the norm.

The advent of the new 3D authoring technology has created a steep learning curve for all those working on the film, but has also allowed for closer collaboration between the directors and the filmmaking team than was previously possible. Three crucial members of that team – lead editor Joyce Arrastia, head of layout Damon O’Beirne and global stereoscopic supervisor Phil McNally – speak to Screen Education about the production process, and about working with the new technology.

**JOYCE ARRASTIA – LEAD EDITOR**

**Editing for animation**

We are one of the first departments to begin on a show and we’re also the last. Because of that, we’re pretty much the central hub of a movie…. we’ll start creating scenes here. We get handed storyboard sketches; [unlike with] live-action movies where film comes out of a camera and then gets handed to an editor, we get sketches – drawings. Then i will cut those together in such a way as to make it appear like moving pictures and play it like a scene. I’ll put in temporary sound effects, music and dialogue … people who work here who have some acting ability will record the temporary dialogue in a scratch booth – a mini recording studio – and I’ll get all those elements and edit them together and then present the first scene to the directors.

Our layout department (the equivalent to a cinematographer in live action) will get the scene next and work with the directors to come up with a new presentation of how the staging should be and what the camera should be doing. [The end result is] much more dynamic; the camera is now moving and you’ve got characters blocked in, although there’s no animation yet.

With each pass I have to make sure when I cut it back in that it’s basically doing what the original intent was when we sent it out … Once I show this back to the directors and they sign off on it, it goes to the next department – animation. This is where they start to fill in more details of the characters and the movement of the characters. So the bodies are now animated, the mouths are animated …
When animation comes back I’m checking for sync; I’m checking that the shot still hooks up with the shot previous to it and the shot that follows it. So it’s really just tracking each shot as it goes through every department, and as it comes back it requires a new creative judgement before we send it off to the next department.

**Working with the new 3D technology**

It was very challenging to be able to play back in 3D as nobody had ever done it before. And the systems that we used to edit with … didn’t support a 3D platform. So the studio put together a team – we call them the 3D task force – who are technology experts and who manipulated different pieces of equipment. The first thing was that we had to take a mono image, which is what we normally work with – one flat image – but in order to play back in 3D you need to have a stereo pair.

So they started sending the shots as a new file called an ‘over-under’, and basically this gave us the stereo pair that we need. The top image represents the left eye and the bottom represents the right. This simulates the disparity between the eyes … [The ‘task force’] came and retrofitted my room; we upgraded to HD [and] they put in [a new] projector. In order for this split image to be projected as a single image, so that I can see it in 3D, we use a box we call the ‘videotron’. It blends the stereo pair as one, and really all I have to do is just click a button. They’ve figured out all the hard stuff.

The studio wanted me to be able to edit and play back in 3D in the editing suite for various reasons, but really to save time, so you don’t have to go to a different site to play back in 3D. It also enables me to flag potential problems.
‘3D turned out to be a powerful storytelling tool. That’s the part that really surprised me, because we’re using it in the same way that you would use camera composition or colour or music or pacing to help set a tone or a style for the movie; the 3D element also does that.’
that are common in 3D. [These are normally] pacing problems, because when you have the added element of depth, the eyes require extra time to adjust from cut to cut and you want to allow the extra time.

Oftentimes I can play a scene back in here in 3D and if I see that it’s too abrupt I can go ahead and add the time, then I can let the other departments know that I opened the shot up – and the studio was really great about doing it almost seamlessly – it just boiled down to me really pushing a button to go back and forth between the 3D and mono. It turned out to be very doable and I felt like I was able to embrace the technology, and I also saw the creative aspects of it. It was just this big technical thing [and I initially thought that] once it happened we were just going to watch something in 3D for the cool gimmicky aspect of it. It turned out to be a powerful storytelling tool. That’s the part that really surprised me, because we’re using it in the same way that you would use camera composition or colour or music or pacing to help set a tone or a style for the movie; the 3D element also does that. So just by lessening or deepening the z-axis (the depth in the shot) we’re able to emphasise key story points and also emphasise a character’s emotional arc. Those aspects to it I thought were really cool, so I guess the thing I’m most proud about is that we did it – we’re doing it – and the results are satisfying.

Benefits of the new technology

I think the most exciting thing about it is that we’re sort of considered pioneers in this process, because we’re the first film authoring in 3D for animation, and we are able to edit in 3D for the first time and play back this technology that they developed for us to do that.

When I heard about it I was really nervous because I really thought that, as cool as it sounded, it was really going to interfere with my basic job of telling the story, and just editing in general and the creative aspects of editing. Of course there was a lot that we had to overcome in terms of technical challenges, but once that was all figured out and they set us up – and the studio was really great about doing it almost seamlessly – it just boiled down to me really pushing a button to go back and forth between the 3D and mono. It turned out to be very doable and I felt like I was able to embrace the technology, and I also saw the creative aspects of it. It was just this big technical thing [and I initially thought that] once it happened we were just going to watch something in 3D for the cool gimmicky aspect of it. It turned out to be a powerful storytelling tool. That’s the part that really surprised me, because we’re using it in the same way that you would use camera composition or colour or music or pacing to help set a tone or a style for the movie; the 3D element also does that. So just by lessening or deepening the z-axis (the depth in the shot) we’re able to emphasise key story points and also emphasise a character’s emotional arc. Those aspects to it I thought were really cool, so I guess the thing I’m most proud about is that we did it – we’re doing it – and the results are satisfying.

New skills vs. old skills

Ultimately my skills on a daily basis are exactly the same – they haven’t changed. That was my fear, that the technology was going to change that. Because when it comes down to it, it’s still about telling the most compelling story you can, and we’re still doing that, so that’s great. But like I said, there was a concern that on a daily basis I was going to be more worried about technical aspects of the 3D, and even though there are plenty of meetings where we talk about the 3D or the stereo shots in particular and what we can do to maximise them, they’re still in the context of telling a better story. We’re trying to be very conscientious, to not do stereo for the sake of the ‘come right at you’ gimmick. So those discussions are still creative, like, ‘What can the characters do for our super stereo moment?’ That is still within the storytelling. So it’s all incorporated and they’re very conscientious about that …

This film in particular has a unique story for an animated movie. In many ways it feels like a live-action movie as well. And so now, with the 3D aspect to it, because there’s been so much concentration on maximising shots and making certain shots more dynamic, it really lends itself more to this kind of movie, and it creates an overall feeling of realism, of live action. I love the uniqueness of that about the film. It makes it very different from any other animated movie I’ve ever seen.

Technological changes in the editing world

The biggest [technological change] has been on this show, for sure. I’d say at this studio they strive very hard to stay at the top and the forefront of technology, so technology is always advancing. Since I

JOYCE ARRASTIA was born in Brooklyn, New York, and is a graduate of the UCLA School of Film & Television. Prior to her involvement with Monsters vs. Aliens, Joyce worked on Shrek the Third (Chris Miller and Raman Hui, 2007). Before joining DreamWorks Animation, she worked on such projects as The Lion King (Roger Allers and Rob Minkoff, 1994) and Dinosaur (Eric Leighton and Ralph Zondag, 2000) for Disney.
started in editing, which was a good ten to twelve years ago, there have been a lot of changes … There’s just the aspect that everything is digital. The tools that they have given us to facilitate things have changed drastically. Before, we would get paper sketches from the artist and someone would shoot them or scan them and they would come to us and we would edit those together as film dailies. Now [the artists have] been given these Cintiq tablets, and they just draw on the tablet into the computer. The quality of that and the ease that it gives those artists … they’re able to give us more sketches. So our initial blueprint, the storyboards we start off with before we animate, all that looks better from the get-go, so we’re able to judge if the story is working better visually or not. So that’s a tool I’ve seen come up in the past couple of years – the digital storyboarding.

And then the other development, that again is leaning more towards the live-action way of things, is that layout gives us ‘pre-vis’ – the layout of the shot – with different camera angles. It’s like receiving dailies if you’re getting camera coverage. The pre-vis really helps us to put together a more dynamic sequence because you can cover it from different ways.

**DAMON O’BEIRNE – HEAD OF LAYOUT**

On layout, and using the new technology

Layout happens after storyboarding; the modelling department give us a lo-res ‘set’. We basically go through and do some very basic animation on the characters to get them in the poses we want, putting the cameras in and creating a very rough blueprint for what the shot should look like.

The problem with this process it that it’s not anything like live action, where the DoP [director of photography] and the directors are standing on set and the DoP’s going ‘I want to be here’ and the director’s saying ‘I want to block here’ – working that out is a great creative fusion that we’ve always been missing. What we would traditionally do is build the shots then review them with the directors and then say, ‘Ah, I don’t like that shot,’ ‘That’s not working,’ and we’d go away and work on it some more and bring it back. So there’s not really that interaction. We’ve never really been able to do that and we’ve always wished we could work that way, to be able to ‘walk the set’ with the directors.

So we have a new tool that enables us to do that – a state-of-the-art 3D virtual camera … What’s exciting for us is that now we have the opportunity to be in [the layout room] with the directors and we can ‘walk’ the set together; we can look round and say ‘this is kind of an interesting place to frame the shot’ and we can really start discussing the possibilities of camera angles.

One of the interesting things is that everything is relative to the screen. If you ‘walk’ forward [with the camera] it’ll actually move forward. So we can scale the space to be as big or small

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as we need. If I have a football stadium I just scale it up and I can ‘walk’ – it’s pretty easy.

There are two steps to our layout process. The first one is the ‘rough layout’ phase. We’ll go in and find some quick rough angles with some very basic animation. We send that down to editorial and they cut it in and we start to finalise exactly what the shots are going to be … Then when we have that established we move it into the more significant departments of animation and lighting and effects.

What’s key for us is that now it is travelling down the stream to get the final performance, and as any cameraman will tell you the best thing is to respond to that performance. When you know what the actor’s doing that’s going to drive … lots of little things – the way a character looks; the way they stand up – all that timing has to be done. So it goes off to animation; they spend four to six weeks really fleshing out the performance and getting a lot from that character – getting the emotion, getting the motivations – and when they’re finished we [get it back] and do what I’ve always wanted to do: get the feeling that it’s being filmed not by a computer but by a hand operator.

All those little happy accidents, those naturalistic things that we’re so used to in our lives … In traditional process we’d actually key in mistakes just to make sure that it didn’t feel too digital. Now we have an opportunity to actually film it.

So what makes it state-of-the-art – nobody else has this – is our ability to look at what we just shot immediately in 3D. For that we have glasses that we only use in production – these are called active glasses. They enable us to look at the material without any processing on it. The best thing is you can see the space – you can actually see how your camera work is working within that environment in 3D.

A new chapter in filmmaking

Jeffrey [Katzenberg, CEO of DreamWorks Animation] keeps using colour as an analogy; I keep thinking of it more as an extra paintbrush for us. For most of my career we’ve been looking for staging that suggests depth – for example, we’d be looking at the road and the long lines of a road that suggest depth – now you put the glasses on and you see the depth. Now we can start using that creatively; we can manipulate it.

I think we’re just at the tip of the iceberg in terms of what we can do with it. Even as we’ve authored we’ve found angles where we’ve gone, ‘Oh! That looks fantastic – never thought it would look so great in 3D.’ And we start to think that that’s how we should shoot more stuff.

DAMON O’BEIRNE is a native of Johannesburg, South Africa, and studied graphic design at the Technikon of Natal. He has been with DreamWorks since 1995, working as a layout artist on The Prince of Egypt (Brenda Chapman, Steve Hickner and Simon Wells, 1998) and as rough layout artist on Shark Tale (Bibo Bergeron, Vicky Jenson and Rob Letterman, 2004). More recently he has served as layout supervisor on Over the Hedge (Tim Johnson and Karey Kirkpatrick, 2006), Sinbad: Legend of the Seven Seas (Patrick Gilmore and Tim Johnson, 2003) and The Road to El Dorado (Bibo Bergeron, Will Finn, Don Paul and David Silverman, 2000).
‘What’s exciting for us is that now we have the opportunity to be in [the layout room] with the directors and we can ‘walk’ the set together.’

**Layout and character design**

During production we’re always responding to whatever [the animators] do. But right at the beginning when they start deciding – for example, deciding how tall Insectosaurus had to be – I had to get in there and lens all that before we said, ‘OK, we can make him this high.’ [The animators might say,] ‘OK, I want to angle off this character to that one,’ and I go, ‘You can’t do that!’ So we spend a lot of time going, ‘OK, if you’re going to keep him this size this is what it’s going to look like through the lenses.’ Even B.O.B – he’s huge – shooting past him was difficult and awkward. We scale our characters up and down until we find the right sort of scale ... Like, Susan has quite a flat face; we started lensing on her and realising what she looked like from the side and the front, and that would then inform character design and we’d change the shape of the eyes, make them rounder and so forth. Ultimately you want her to look great at every angle, so we get involved right from the beginning.

We do the same with sets; we look at the set and go, ‘Does this feel like the right sort of scale?’

**New technology and time efficiency**

Everything is scheduled and we go through and look at the complexity of the scene. So for example with the bridge battle – we go, ‘OK, that’s going to take us three months to work that out.’ There’s so much logic going on there – story, complexity, staging – so we allow a lot of time for something like that. Then, of course, juxtaposed against that you have a simple little dialogue scene with two characters, which is as easy as it gets.

But averaging it out – I have a crew of about eight people and we might spend three to four weeks on a scene before we’ve really finalised it through editorial. We can build it quite quickly but it’s getting it into editorial, cutting it, deciding what we need, organising that, reshooting, getting it back in [that takes up time].

In terms of the technology speeding it up, it’s helped us get more finite with the directors. But then as soon as you make it easier, you do more. I feel like the fidelity and what we are doing with the camera is so much more complex and interesting and cutting edge but it’s not necessarily more productive.

One of the other journalists was saying, ‘I can’t believe how much detail there is in our movies now.’ For example with the ‘First Contact’ scene, I can imagine that if we shot that not using 3D four years ago there would have been fifty tanks in the shot; in the scene there are 300.

**Technological changes in the layout world**

It’s funny, because I got onto this show before they announced it was going to be 3D, and I went, ‘Thank God, I’m going to be on this show where the pipeline’s going to be exactly the same as the last movie I did and everyone knows what they’re doing and there’s no learning curve,’ then it was, ‘You’re doing 3D.’

Almost every movie I’ve worked on we’ve been pushing forward with technology. I started in London really, but my first movie was *The Prince of Egypt* [Brenda Chapman, Steve Hickner and Simon Wells, 1998] which was completely traditional – all the layouts were hand drawn. Then with the show after that we started doing integration, so we’d create these environments and project textures onto them; make the environments actually move dimensionally. Then we’d have animation drawn to that dimension change.
We then had the stage where we did true digital movies: we did *Spirit: Stallion of the Cimarron* [Kelly Asbury and Lorna Cook, 2002] like that; we were doing these extremely complex interactions. On *Sinbad: Legend of the Seven Seas* [Patrick Gilmore and Tim Johnson, 2003] we had massive amounts of interaction with a 3D boat and 3D water – there was a whole pipeline written around that. Then we went completely to digital movies and that was a new pipeline. So it’s just par for the course. I keep waiting for it to quieten down. I have to say at this point it just feels like it’s endless in its possibility and opportunity. So much so that you often think of workflow and you think, ‘OK, how are we going to make everyone work the same way?’ You start off with something new – you’ve got to teach everybody how to do things, then you’ve got to get everyone fluent and you’ve got to write the systems to make sure it’s consistent and solid. I’m feeling now that this and the shows following it are going to be exploring new ways to do it, better ways to do it, quicker ways to do it. It’s a constant evolution.

**PHIL MCNALLY – GLOBAL STEREOSCOPIC SUPERVISOR**

-On stereoscopics and 3D-

What [this department does] is work through each individual shot. And as we’re doing what we call layout – the camera work – we try to maximise the 3D in each individual shot; to make sure the characters look right and make sure it’s comfortable. We don’t really know how it’s going to look until editorial take the shots and put them into an editorial sequence. And then what we might find is that we have one shot that’s far back and the next shot is close up and the next one is far away, and even though individually they all look good, the stress on your eyes [from] having to jump back and forwards is really high. And although digital projection and production has pretty much eliminated all the eye strain errors of the past caused by bits of film being out of sync and out of alignment, the one thing left that we have to control is the jumps between edits.

So what we’ve done is develop tools in-house specifically to deal with the blending across the cut of 3D, something that has never really been done before, and it couldn’t really be done with film because what you captured on film was where you were locked in.

One of the most basic [adjustments that we do] is to take the whole stereo space and either move it forwards or backwards to control the placement of the shot.

[We can take] shots that were otherwise very jumpy and just [smooth] out all the bumps so we can make it completely smooth across a whole cut. Then we can introduce contrast to the point we actually want to create a shot or create contrast within the sequence. This is something that’s been developed in-house here at DreamWorks, specifically for the purpose of editorial pass of stereo, which hasn’t really existed before. It’s always been a case of trying to cut together what we have and see what works.

**Old technology vs. new technology**

You often read that it’s not the old 3D, which you probably remember as being the red and the cyan anaglyph glasses. That’s true – most people remember 3D as being red and cyan, and it’s really

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weird, and it feels like you’re off balance because the colours are so strong. But actually, if you go back far enough, to the 1950s, to the last 3D boom – and I say that because that’s what people seem to consider the boom, back in the 1950s when you had *Creature from the Black Lagoon* [Jack Arnold, 1954] and *House of Wax* [André De Toth, 1953] and those types of movies – at the time they were released they were not in that process; they were full colour and they were polarised. But as much as that is similar to today, in that we’re doing polarised-based projection with RealD, or something similar with Dolby, which uses a colour system, the real difference is digital production and post-production.

In our case, computer animation is all digital, from beginning to end. And so you can imagine the difficulty of mechanically getting two cameras synchronised, aligned, lenses correct, pieces of film running through at the same rate, and also having to redo that in the projection booth as well. Now IMAX has done an incredible job of making that system work incredibly well. They’re film-based, real cameras, real mechanics, real projectors running film. But you’d also say that IMAX is very high-level technically, as a company. The problems in the past have been when stereo film goes out to a regular theatre – maybe there isn’t that much attention to detail in terms of projecting the film, and it only needs to be one frame out of sync, and it’s incredibly painful. And that’s where the reputation of 3D being headache-inducing has really come from.

Today in digital production we’re able to produce, and then deliver, perfectly aligned and perfectly synchronised stereo through a single digital projector. And that’s what’s so unique – that the one projector, literally, is putting out left and right images almost at the same time. They’re running alternately at such a rate that it looks like it’s at the same time.

And of course we can absolutely dial the stereo settings in over and over again until we find it’s exactly how we want it, and that’s still a challenge for live action, because the director likes the takes, they see the performance the actor just did – ‘OK, that’s it, I want that take’ – and if the stereo wasn’t quite perfectly set there’s not really very much you can do with it in post. But those techniques are also developing to allow live action to have the kind of control that we have. Of course our actors just keep going as many times as we hit the play button because it’s all digital, and we can respond to the animators’ performance in the character, and we can adjust the stereo and do very fine tuning and animate those parameters across a shot.

**On the possibility of glasses-free 3D**

There are techniques called autostereo-scopic techniques – Philips developed a TV that has something called a lenticular screen; basically it’s a screen with very fine lenses on it. It’s still based off the same type of principle – that you’re having to generate a unique view from your left eye position and your right eye position and you have to get them back into each eye. The very simplest example is if you hold your finger up and close one eye then the other you can literally see that shift in the world. While we’re making the movie we literally have to make one movie from this point of view then another movie from this point of view – two completely separate versions of the film.

So as you can imagine, somehow trying to project that, and have the light only get to the eye it’s supposed to get to, is incredibly difficult. There’s talk about holographic TVs and eye tracking systems – there are various things in development – but nothing that’s really mainstream yet. The closest autostereo-scopic TV, meaning something that you just look at and see the image without glasses, is the lenticular screen. It’s basically a ridged surface – remember those things you get in cereal packets and you’d tilt them and they’d show animation? – that’s basically a lenticular screen that lets you see one frame and...
then another frame. So that system is used for 3D, which means that you have to be sort of in the right position, so then your left eye can see the left image and your right eye can see the right image. So within certain situations they’re working pretty well, sort of point-of-sale or display type of systems, or if you’ve got your seat perfectly set in front of the TV. There’s some sort of tolerance but [if you go too far to one side] it will start to flip over.

Challenges of the new technology?
I’ve been doing stereo photography since 1991, so in terms of understanding stereo, that’s something I’m very familiar with. So I guess the challenging thing was that the technology didn’t exist, so we’ve developed our own tools in-house to be able to control the stereo depth. Purely from the technology/tools point of view, we had to build everything from scratch. You can’t go and buy the 3D software the way you can for animation. So myself and Paul Newell, who is the software developer here – we’ve worked closely together; we were both at Disney as well, and developed tools there, for Meet the Robinsons [Stephen J. Anderson, 2007] – we developed stereoscopic tools that are very easy for the artist, who doesn’t know technical details of stereo, to use. So as a supervisor I can look at shots in the theatre and say, ‘OK, let’s make it ten more, or let’s take five off,’ and the artist can go back to the desk and can apply these pixel shift numbers, but under the hood, all the software is doing a very complex calculation to come up with the interaxial setting based on the lens and convergence point. But we have a common language now, which is, ‘OK, ten more pixels, make it five here, ten here.’ So that’s been a challenge that we’ve overcome.

Creatively, the challenge is 100 years of 2D cinema and the experience of 500 artists trained in 2D … an amazingly sophisticated language has been developed that represents depth in a medium that is flat. I like to make the comparison of painting and sculpture. And so the artists at the studio – their whole careers have been based around creating flat art that represents space, among other things. So it’s like we have 500 painters, and Jeffrey Katzenberg says, ‘Right, sculpture! Everyone start sculpting!’ And you can be a great sculptor and a great painter, but it’s a different skill set which isn’t necessarily in place. And just the ideas themselves … the creative ideas you’d have for a painting are completely different to the creative ideas that you may have for something spatial, a sculptural installation … And it’s going to take quite a long time for those skills to really develop in all areas. So each day there’s the challenge between not only trying to create the spatial filmmaking experience, but we’re also in the situation where the film has to be excellent in both 2D and 3D at the same time.

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