THE NEW REALITY

It is not just cartoon characters that are inhabiting exciting new universes. In the area of reality-based movies, animation is also helping to redefine the rules of the possible and impossible. **Luke Clark** spoke with one of the technical magicians helping to remake reality

While the world of enlivened toys, rats and pandas is a compelling one, equally brain-bending in terms of the way we perceive our world is the work that animators now do in replicating the real world — then bending it into a new and improved one.

A specialist in exactly this type of work is Dr Paul Debevec, associate director of graphics research at the University of Southern California's Institute for Creative Technologies, in the US state of California, and a research associate professor in the computer science department of the university's Viterbi School of Engineering.

Debevec's career was kick-started in 1996, when in his doctorate thesis he presented an image-based modelling and rendering system, called Façade, for creating photo-real architectural models from photographs. His techniques were used to create virtual backgrounds for "bullet-time" shots in a new science fiction epic. "*The Matrix* was a very successful merging of the story that needed to be told, and the technology that was just beginning to become available. It's about being in a simulated world, where the rules can be tweaked."

"The techniques I had been developing had digitised the real world from photographs, to create this 'virtual mirror' world. It looked very similar, but gave you these sort of superhuman abilities to move the camera anywhere that you wanted. This meshed well with the visual effects supervisor's goal, to 'digitise reality, and then bend it to your whim,'" he says.

Having his technology in one of the coolest movies of the 1990s was a big break. "It is a really great thing to have had even a small part of," he tells *DCM*. "Sometimes you get lucky."

Bending reality has practical applications in everything, from architectural design all the way to historic recreations. "It's very much like creating this *Matrix* world of reality, where if you use your mental powers, you can make the world anything you want it to be. It is an incredibly powerful role for a storyteller."

The movie *Inception* would never have been possible without such freedoms. Some of its most memorable scenes were the product of visual effects supervisor Paul Franklin's company, Double Negative. "His company took these very interesting ideas that [director] Christopher Nolan had dreamed up — and made Paris fold in on itself," he says.

Debevec worked on one of the recent breakthroughs of reality-based animation, leading the development of a series of light stage devices for digitising the shape and appearance of human faces. For his efforts, he received a Scientific and Engineering Academy Award in 2010, along with three of his peers.

Such techniques helped him bring to life characters in James Cameron's *Avatar*, which features several fully-digitised characters. "We did some very high resolution face scans of the actors, to give to the special effects artists at [Peter Jackson's] Weta Digital to create the Navi," he says. "A video of the real actors was used to derive the digital characters. The more these faces have in common, the better for getting that performance to read through correctly."

Getting human faces right has long been a challenge, given the sheer complexity of the fine movements in a face. Judging by *Avatar* or Steven Spielberg's *Tintin*, the process approaches perfection. "The technology has improved: we're using video of the actor's faces, not just the trajectory of dots applied to the faces, as the input data. So we actually see what the [actor's] eyes are doing."

Some hilarious results came from facial modelling left unchecked. "If you programme it wrong, you could actually have the eyes fly right out of the head."

One irony of technology is that it sometimes allows a storyteller too many possibilities. If a director hasn't thought through the process early, the result can be a real mess.

"In a world where anything is possible, you don't have the same things forcing you to create a good film," he notes. "That's one of the biggest changes, and will require a different kind of director." ●

IMAGES: WARNER BROS PICTURES (INCEPTION); WETA/PARAMOUNT PICTURES (TINTIN); WETA/20TH CENTURY FOX (AVATAR)

TOP: IN *INCEPTION*, THE LAWS OF PHYSICS WERE SUBJECT TO THE WILL OF THE ARCHITECT
BELOW, LEFT TO RIGHT: IN *THE ADVENTURES OF TINTIN* AND *AVATAR*, THE LINE BETWEEN REALITY AND ANIMATION IS A BLURRY ONE