



They were once a printmaker, a NASA shuttle engineer, a sound technician and a software developer. Nibbled by the CGI bug, they changed tack – and left in their wake the likes of *Monsters Inc*, *Batman Begins* and *The World is Not Enough*. Now they're giving something back: 4Talent magazine grills the battle-hardened tutors at Escape Studios about the many facets of computer graphics.

Escape's manifesto is simple: "to provide the global computer graphics community with the best training, technology and talent in the world." While in-house tutor and recently-crowned *Maya* Master Lee Danskin insists that there's "no such thing as a 3D industry" per se, one thing that film, TV, games and commercials share is a voracious thirst for CGI production talent. It's just the way it's applied that differs.

### Character design

"Character design is about injecting life. You may not be able to draw, but if you can sculpt then it's much easier," suggests Escape's character guru Nick Savy, whose proudest spot on his showreel is an indistinguishable 3D stunt-double for Christian Bale in *Batman Begins*.

Playing God with the caped crusader may sound like a small boy's dream – and Nick admits he's spent his life sketching comic books and cartoons – but he's keen to point out that character building, like animation,

involves a huge amount of repetition. And woe betides a rigger who puts a bone out of place.

"You have to be precise when building your rig. I once purposely made my students do a rig wrong, and then re-build it," he smiles. "They were very pissed off, but that repetition is so important – for *Batman* we did 62 versions of the rig and 38 iterations of the muscle system." It's all-too-tempting to quip that character building builds character – although you may well risk repetitive strain disorder in the process.

Nick's route has been something of a rambling one. When in a band in the mid-80s he became obsessed with synthesizers, mixed some tracks in the studio and ended up working as a sound engineer for five years. It was helping his brother on a corporate video in '92 that first broke him into his current trade: "I learned animation; he paid me with a computer," he states simply. "I'd literally never touched computers until then."

When Sega were setting up a new studio, Nick managed to weasel his self-dubbed "crappy" folio in front of them. One small segment made the difference: "A random animation of a psychedelic hippy. He had a pointy hat with a sphere on the end, surrounded by Saturn's rings. When he bent forward it rotated, dangling in time – it was the detail in the secondary animation that caught their eye."

His seat-of-the-pants journey makes for exhausting listening. He worked in games for five years; was interviewed for *Glassworks* while his wife was giving birth; eventually became head of the FMV (full motion video) dept, and then moved into commercials.

After three more years he ended up at Pinewood Studios as a modeller. "They asked if anyone had experience of rigging, and ended up making me Head of Characters. Then I was taken on at Double Negative to work on *Batman*, where I peaked."

His first film project, it was a hefty eight-month stint. "By the end I was bored

## HOW TO 3D ANIMATE

**Pose to pose** is the traditional method, favoured by animators with a hand-drawn background – although 3D can use this method too. The head animator creates the critical poses that define each shot; the extremes of movement. Another animator adds key mid-stages, and then the gaps are filled in to achieve smooth motion.

**Top-down** is a CG-only method, relying on a 3D character's centre of gravity. At first it uses as little animation as possible to express what's happening in a scene: everything is roughed in first, and then subtle details, expressions, hair, clothes and so on are added later.

It's often at the director's discretion which approach to use, and the two can be blended as required – whether you're working on a full-blown action sequence with all limbs flailing, or intricate speech patterns for a close-up facial shot.

"Lip-sync, for example, can be top-down or pose-to-pose – it varies for each production," reveals Jeff. "But it's not as hard as people might think. There are certain phonic mouth shapes and library poses for *ooh*, *ah* and so on, which can then be refined to add personality. We actually found out that deaf students love Pixar movies, because they can lip read them," he adds proudly. "That's just not true of traditional animation."

crapless," he chuckles. "But it's the only one I actually got my name on the credits: usually there's a big turnaround of staff – lots of freelancers – so people get missed off."

As the story goes, director Chris Nolan was dubious that a digital Batman would be convincing enough on the big screen, and wanted as much stunt work in camera as possible. Nick was part of a team that set about creating screen tests to be projected next to live action. Christian Bale was body-scanned in full costume, and then the resulting 3D model was equipped with a complex rig, coloured with a bespoke shading system and key-frame animated – no motion capture was used. Thankfully, Nolan was impressed.

"You're interpreting the world into 3D. Not the mechanics, but how something moves," Nick concludes.

"Modelling and skinning is very artistic: how the crease works when an arm bends; how material crumbles under the armpit; how the muscle inflates. It's how it *looks*, not necessarily how it works. Then it's up to the animator to make it move."

### Animation

Seeing animated characters interact with humans in '80s toon-gangster flick *Who Framed Roger Rabbit?* sparked creative impulses in Jeff Pratt, an engineer at the time. He opted for a change, went to art school for four years, and fortuitously ended up at the doors of Pixar just as they were gearing up for a second run at *Toy Story*.

"They'd had story problems, and it was on hold," he recalls. "At the time I was the fourteenth animator hired; they thought I'd be one of the last. There were 40 in the end." In such a large team, and with CGI animation requiring increasingly realistic movement, an aptitude in engineering helped him specialise.

"I like the technical aspects," he admits, small surprise given he started out tinkering with space shuttles for NASA. "Take the spring in Slinky Dog – I was the only animator that could understand how to make it work convincingly, using sine waves and so on."

And while the traditional process of sketching scenes frame by frame has been replaced by tweaking rigs and walk cycles, roles are also split differently. "For hand-drawn animation, a team is assigned to a certain character to make sure it's drawn consistently – when you're working on computer, that's all defined already," he points out.

"On a production like *Toy Story* or *Monsters Inc* there's a team of up to 40 animators – you can't have two animators on one character while the other 38 sit around twiddling their thumbs. You work on the shot as a whole."

With the whole team dipping into a central pool of characters, it's essential to get the puppet controls set up properly in the first place. "A modeller and a rigger will work closely with the animators to develop a character and test it," confirms Jeff. "And the more the animator knows about rigging, the better: it helps to understand the whole process."

Fundamental to all forms of animation is the walk cycle, and as with the character rig, this will be crafted first. "A team of animators will spend two weeks honing it down to minute details, and then it's used by everyone in production," he reveals. "You're always improving: walk cycles are unique to each character, and help to define personality."

With rival studios pushing each other's standards higher by the day, it's crucial to stay across all new developments – and Pixar provides all its in-house animators with bespoke preparatory software that's updated for each production. So with a clutch of seminal CGI masterpieces behind him, what were the peaks?

## HANDY 3D DICTIONARY

**No shame in looking it up: we certainly did**

**Modelling** is simply the process of shaping a particular object in 3D, not unlike sculpting. This is usually done from scratch using modelling software, although it's also possible to scan in real-world objects.

**Rigging** is also known as skeletal animation, and involves building a hierarchical set of moveable bones underneath the 'skin' of a character or object. Each has an optional 'parent' bone that can affect it: e.g. moving the lower leg will also move the foot. Bones are then connected to corresponding portions of the character's skin.

**Skinning** literally involves binding a character's 'skin' to its skeleton at key points, so it can be manipulated whenever the skeleton moves. Various methods exist: rigid skinning for instance is quite mechanical, with one joint controlling one portion of skin, whereas smooth skinning is more complex, with multiple forces at work.

**Walk cycles** are notoriously difficult to carry off convincingly. In simple terms, they're a series of looped frames representing a walking motion, but it's not just about legs – they must also take into account the motion of arms, torso and head, for example, and will differ hugely if a character is running, striding or tip-toeing, for instance.

**Rendering** is the final stage: converting your model into a series of high-resolution 2D images, similar to individual frames on film. Various levels of realism can be achieved depending on how much processing power you have, and it can take anywhere from a few seconds to several days for a single frame.

**Camera tracking** is a digital imitation of the movement that a real camera has already made, used predominantly in the visual effects field. If this is done successfully, then a 3D object placed in front of the virtual camera and then laid on top of the live footage will integrate seamlessly with the scene.

**Compositing** is the process of combining several visual elements into one, to create the illusion that they're part of the same scene. One element is usually filmed in front of a flat-colour screen, which is then replaced digitally to blend two or more elements seamlessly together – often referred to as bluescreen, greenscreen or chroma-key shooting.

**Tri-stripping** is, if you really want to know, a process by which adjacent triangles on the surface of a 3D model are grouped into 'strips' that share vertices, rather than lots of individual shapes. This speeds up the rendering process by cutting the workload.

**Texels** are the units used to texture a 3D model, also called texture pixels. A process called texture mapping attaches the appropriate texel to the model – and it can then be 'clamped' to one specific area, or 'wrapped' around the whole model.



## ESCAPE AWARDS 2008

### A snapshot of the industry

Hosted at Tate Modern in March, the Escape Awards 2008 showcased and celebrated a healthy cross-section of CG talent across visual effects, film, games and design. Here's a summary of the eight winning projects, which took from a few weeks to several years.

#### CG in Broadcast: Framestore-CFC for Primeval

Framestore supplied 13 CG creatures and more than 730 animation and VFX shots on the first dinosaur-packed ITV1 series. Timeframe: 8 months. Tools: Maya, Mental Ray, Shake and Inferno.

#### CG in Commercials: Glassworks for Ford's Flexifuel

Not a single vehicle is shown in this spot for Ford's emissions-reducing product; instead we're taken inside the wombs of an elephant, dolphin and polar bear to see the growth of a foetus. Timeframe: 5 weeks. Tools: XSI, Mudbox and Photoshop.

#### CG in Film: Framestore-CFC for The Golden Compass

A 200-strong team worked on more than 300 shots for this Oscar and Bafta-winning feature. Timeframe: 15 months. Tools: Maya, Houdini, Renderman, Mantra, Matchmover, boujou, Shake, Inferno and Framestore's in-house mRig

#### CG in Music: Framestore-CFC for The Salmon Dance

The Commercials 3D team polished off some 320 hand-animated fish for this surreal Chemical Brothers promo. Timeframe: 8 weeks. Tools: Maya, Houdini and Inferno.

#### CG in Games: Ninja Theory for Heavenly Sword

The production process for this tale of a doomed heroine avenging her people was almost as epic as the narrative, with 95 staff from Ninja Theory alone breaking new ground by capturing face, body and voice performance simultaneously for up to five actors. Timeframe: 4.5 years. Tools: Maya, Photoshop, ZBrush, Mudbox and Motion Builder.

#### Design Visualisation – Moving Image: Uniform for The Crystal

With no brief as such, the team had free reign creatively – they simply had to complement the other marketing for this design-led development. Timeframe: 3 months. Tools: 3dsmax 9, VRay, Brazil, Mental Ray and Combustion 4.

#### Design Visualisation – Still Image: Burrows Nvisage for Land Rover LRX

Tasked with exhibiting the LRX in an iconic London location, the team delivered a traffic-stopping CG image to light up Piccadilly Circus. Tools: 3dsmax 9, ARTVPS RenderDrive and Photoshop.

#### Student in CG: Ian Wharton and Edward Shires for Solar

Ian and Edward, who studied at Cumbria Institute of the Arts, wrote and directed Solar while in their final year – inspired largely by Roald Dahl's BFG both for its story and its delicate balance of believability and fantasy. Timeframe: 7 months. Tools: Softimage XSI, After Effects and Final Cut Studio.

"For me, milestones are technical ones," he confesses, perhaps unsurprisingly given his background: "the fur in *Monsters Inc*; the clothes in *The Incredibles*. It's getting close to absolute realism now: motion water works pretty well off-the-shelf; clothing still has its bugs but it's pretty good."

So how important were those four years studying tomes of art history, traditional drawing, photography, colour theory and the like? "It's useful, but none of that is required for animation," Jeff admits. "A polished 20-second piece will get you a job, not whether you can draw."

### Games

"At some point in the future, the visual quality of film and games will be indistinguishable," foresees Simon Fenton, ex-Sony Computer Entertainment and now creator and tutor of the centre's Games courses. "But there's a real demarcation of roles. In film, you could just be a character modeller. In games, until recently a senior artist would do character, environment, assets, everything. Now those roles are starting to separate."

Equipped with a Fine Art degree in Painting & Printmaking, Simon might not seem like the archetypal gamer – although it was the printmaking process that first got him interested in mechanical reproduction, not so far away from rendering thousands of frames to produce an animation sequence.

"That was 15 years ago, when silicon graphics machines were the price of a house," he recalls fondly. "The only way to get access to the software was as a runner at a post-production house. So that's what I did. I taught myself *Alias* and *Softimage* in the evenings: I was actually sleeping in the studio to get access to the machines."

At a similar time, Lee Danskin was starting his career at Alias Research, putting the wheels in motion for the first ever version of Maya. With a visual effects background – he went on to co-found Smoke & Mirrors 3D, before becoming Deputy Head of 3D at influential London post-house MPC – he speaks with a helicopter view.

"Yes, the finished products are converging, but the way you apply tools in the pipeline is very different," he reasons:

clearly the language of a man who's dealt with budgets and workflows as well as being at the creative coalface. "You'll never have to master camera tracking in games, or compositing – they talk about tri-stripping, and how many texels you have."

Creatively, an understanding of film is useful: "The language of cinematography will come into gaming," Lee admits. "They're starting to apply the process of a real-world camera to a virtual camera, so you're not always bumping into walls jerkily. But you'll never have to reverse-engineer a virtual camera as you do in the effects industry."

Particularly with the growth of hi-def consoles, there's never been higher demand for stunning 3D game graphics – and Simon asserts that the volume of work has quadrupled in recent years. "Studios are outsourcing to India and China to meet the volume, but this can be an unhappy experience if the quality isn't up to scratch," he goes on. "As a junior artist in the UK you have to hit the ground running, specialise, and raise your game to make it worth paying you more."