Fat Panda: From 2D to 3D Visual Design Development in Kung Fu Panda

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Introduction

Every animated feature is built on the back of a cast of characters who walk through their various narratives in many different environments. While the stage for these characters is still a story treatment, their main focus is compelling interaction and purpose. However, as soon as their stage broadens into the visual development step of film-making, we have wider goals.

While cohesion of story is ongoing, cohesion of design language for the film begins in earnest. The language we use to talk about the look of the film begins to develop and this language carries us from the early days of visual development all the way through to the last lighting final and even to color grading.

Dreamworks Animation's Kung Fu Panda (KFP) pays homage to the genre of kung fu movies from Chinese cinema. We look both to geographically Chinese species and to some of the main fighting styles of kung fu for the genesis of the characters in our film.

The Design Aesthetic

The characters in KFP employ fairly non-complex design silhouettes with more complex internal shapes. The internal shapes are often contrasty in value and hard-edged and graphic in nature. While there is textural detail internally, in clothing, skin and fur, the textural read should never interfere with the graphic design read, creating a 2D design aesthetic in a 3D CGI film.

Saturated colors are also a big part of the design aesthetic. To a large part this lets the characters lift off of and stand out from the background environments. Where there are not whites or blacks on our characters, there is often a saturated color. Protagonists are more contrasty and more saturated than antagonists. Protagonist are also mostly warm hues, while antagonists are built on cool color palettes.

Challenges Translating to CG on the Panda

There are many challenges in translating very contrasty and saturated character designs from 2D visual development into 3D CG. Our main character, Po the panda, had considerable translation challenges.

A black and white character is one of the most difficult setups to light since the whites will generally blow out while the blacks will generally turn into black holes on film and both white and black areas will lack detail. Our panda is also built very roundly, as part of his character and main story point is that he is a fat panda, and this doesn't help since that means he usually has large gently sloping planes facing lights, which makes his body blow out under light even more.

Early on we decided that our characters would have short, non-dynamic fur so we didn't have to run every shot through the effects department for fur. The fur was also kept fairly well-groomed in keeping with the graphic nature of the design aesthetic and to keep the characters looking clean and attractive. While short fur saved a lot of man-hours for the budget of the film, it presented difficulty in Surfacing because we really couldn't hide behind long hair. The shadows that long hair create would have helped a lot with the problem of blowing out in the white fur and added a lot of internal detail. The density of our fur also could have been a lot less dense. So, we had a black and white, round character with very short fur, a difficult proposition to light.

We had to lay the base layer of hair down to cover the skin since that layer of hair was very short, so the groom became very important. Its direction was a design element, radiating outwards from the top base of the snout on the face, continuing out radially on the body. The overall groom is very easy to read, with directional randomness that does not interfere with the overall direction but adds enough internal detail to break up the surface for lighting. Another longer, less flat and less dense fur body breaks up the profile and adds much more or a perception that his hair is longer. This length of this hair is actually based on the angle of the surface to camera and grows longer in profile.

We knew the black areas of the character would be defined by the specular on the hair, and fought a look we coined the 'wet seal' look, where his black area looked like a wet black seal with specular that raced around it as he moved. The specular had to be confined mostly to the longer black hairs to combat this.

With the panda, as well as with other characters, we had to hedge our bets with saturation since we knew lighting design would also be very saturated. The whites ended up being subtly warm and non-white, while the blacks were dark browns. We rendered all characters in surfacing under a variety of lighting setups to make sure the most saturated ones took all colors of light and they were all uniform in their response. Fur groom always turned out to be very important to add enough internal detail but also served to break value and saturation up so the graphic and saturated characters could take light.

Environments

Most of KFP's environments are taken from geographical regions in China that present the most beautiful locations for our characters to enact their narrative, be it a furious kung-fu fight or a moment of thoughtful self-discovery.

These environments are also taken taken straight from much of the artwork of Chinese painters, who used these same geographical locations as inspiration for their paintings. We incorporate the same graphic language in the macro detail for our environments, with mountains with giant brush strokes of jade through them, down to the micro detail, with moss that holds a distinct brush pattern in its layout and growth pattern.

We used procedural shading very sparsely, painting almost all textures to achieve this very specific look. The locations were painted to look historical and ancient, but not in disrepair. Age was always painted in with a designed structure instead of an overall weathering, so as to support a clean read.

Conclusion

The graphic, contrasty design aesthetic of Kung Fu Panda creates a uniquely designed and visually compelling CG film.