

PRE-RENDERED AND Digitized GRAPHICS

Sometimes a game developer goes down the wrong path in the effort to stand out from the crowd. They might be looking for a visual edge over their competitors, or they might be trying to solve a development problem, or maybe they found a clever new concept and they need to try it out.

Whatever the reason, a developer will sometimes turn to digitized or pre-rendered graphics, and it's almost never a good idea.

Both methods involve sprites and other graphics that are not created the traditional way, with artists painstakingly applying coloured squares to a grid manually. Instead, a digital image is prepared from another source, cleaned up and reduced in size and palette to match the capabilities of the target platform.

Digitized graphics are not new. Their first use was in 1983, in the arcade game *Journey*. It featured digitized faces of the titular band on standard pixel bodies and backgrounds.



Digitized sprites never really fell entirely out of favour, but the technique became very popular in the late eighties with Williams' *NARC*, Atari's *Pit Fighter* and Midway's explosive 1992 release, *Mortal Kombat*. For a while digitized graphics were the big bandwagon everyone wanted to jump on.

Pre-rendered graphics use a similar process, but instead of starting with photographs, artists create 3D models on computers far more powerful than the system on which the games will be played. These 3D models could be posed and animated, and then 2D images are produced and manipulated just like the digitized photos.



Perhaps the best known game with pre-rendered graphics is *Donkey Kong Country* for the Super Nintendo. Over nine million copies were sold, and it single-handedly made the aging 16-bit console a legitimate contender versus the new 32 bit monsters, Sony's Playstation and Sega's Saturn.

It didn't hurt that *Donkey Kong Country* was an exceptionally good game, featuring one of Nintendo's oldest characters, but it was the graphics that got all the attention.

Below: *NARC* (arcade)



And for good reason. In motion, if you don't lean in too close, Donkey Kong Country appears to feature incredibly beautiful computer generated graphics on a platform that had previously only shown the same old pixels players had been seeing for over a decade. Suddenly, blam! All that fancy CGI stuff you see in movies, in a game!

But when you do lean in close the limitations start to appear.

The Good and the Awful

There are several reasons digitized and pre-rendered graphics are used.

Realism - sprites and graphics created from 3D or real-life models have lighting and shadows more realistic than a traditional pixel artist could create.

Animation - especially with 3D models, additional frames of animation can be created simply by posing the already-created models, so no pixel artist needs to draw and re-draw many barely different images. Animations also become easier to create, especially with 3D models.

Porting - when bringing a successful game to multiple platforms it's easy to match the target system's resolution and colour limitations by simply re-processing the existing sprite.

All of these things bundled together start to make a argument in favour of developing 2D games with pre-rendered sprites.

Realism

Digitized graphics looked very realistic, and they should, they're photographs after all. Clay models, toys, actors, all imported into the virtual realm and made to fight for our pleasure.



It would be somewhat curmudgeonly of your humble author to presume to judge realistic graphics a lesser benefit to video games than traditional pixels.

But it's my bloody book and realistic graphics suck and if I wanted realism I'd play outside! *Ahem.*

Anyway, they're blurry. When an image is digitized its analogue existence is broken down into discrete pixels. If a person's eye happens to fall on the boundary between two pixels it is averaged between them both.

And then the image is resized, made smaller for the low resolutions of the system playing the games, and many pixels are reduced to a few, and if a person's averaged eye pixels fall between two of the new smaller pixels, it's averaged again. At each stage the averaging process reduces clarity and detail.

And then, finally, the number of colours need to be reduced, so what was a sort of pinkish grey half-eye half-cheek pixel has a new colour chosen by the computer that matches neither cheek nor eye, but happens to be a colour required by a dozen other pixels somewhere else.

And the end result is images with no detail. On the previous page, where is Donkey Kong's left eye?

Mario, below, looks very different in *Donkey Kong* for GameBoy in 1994, and *Mario vs Donkey Kong* for GameBoy Advance in 2004. The new pre-rendered Mario has no eyes at all, and is - at best - indistinct.



Below: Donkey Kong Country (SNES)



Animation

The benefits of smooth animation apply more to pre-rendered graphics than to digitized ones. This is especially true if the digitized objects are models, where the result tends to be jerky and unconvincing like stop-motion movie effects.

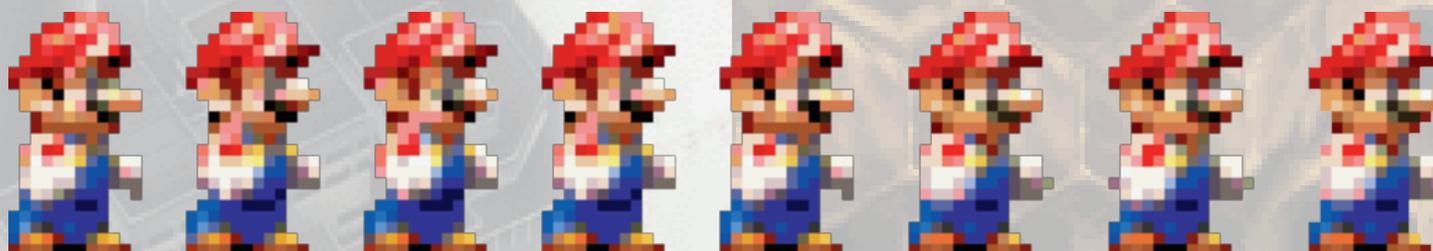
Primal Rage was bad for this, the dinosaur movement was always disjointed and chaotic. *Mortal Kombat*, despite its popularity, never moved as smoothly as *Street Fighter* did.

As traditional animation is created the animator draws each frame in relation to the last. Each frame, to the best of their ability, transitions smoothly from the last, but a digitized photograph or video is fixed from the moment it is first recorded. If the artists decide a frame is missing or the current images won't work then another shoot is needed to create the appropriate source image. With traditional pixel art, of course, the required frames are simply fixed or drawn anew.

Pre-rendered graphics lead to extravagance, especially as storage space in modern systems increased. Nintendo never had a breathing animation when Mario stood still in traditionally drawn games, he just *stood still*. When the pre-rendered *Mario vs Donkey Kong* came out they splurged on a full eight frames of Mario doing nothing at all.

And why not? The 3D model was made, it was no significant effort to move Mario slightly to create these frames. This sort of *animation for the sake of it* would have driven a traditional pixel artist mad.

But this animation comes at a familiar cost. Mario has no eyes, his hands are occasionally hooked and the brim of his hat disappears twice. Our familiar hero has become a flickery mess of smoothly animated pixels.



Background: DoDonPachi Dai-Ou-Jou (arcade)

Cave is known for being one of the last developers still creating shooters, and they're big on pre-rendered graphics. At the top of this page is the movement animation for a player ship in *Ketsui*. It uses seven different frames for each right or left direction.

Raiden, which uses traditional pixel graphics, has only two frames, and they're the same for both directions - the sprite is simply flipped.



Porting

Every game system is slightly different. Sega's Megadrive lacked the colour palette available to the Super NES, but it could run higher resolutions. Many Megadrive games used 25% more pixels across the screen than SNES games did.



The arcade *Primal Rage* sprite (above, left) uses 59 colours. The ported SNES sprite is a mere 14 colours, and the Megadrive sprite on the right is a measly 11. The narrower console sprites would stretch out a bit on a TV screen, approximately matching the arcade's 30% boost in horizontal resolution, but the arcade's far greater storage allowed much larger sprites.

Background: Donkey Kong Country 2 (SNES)



For a traditional pixel developer, porting required extra effort when a game was to be released on several platforms. It was relatively easy to adjust the colours, but if different resolutions were to be used then sprites needed to be re-drawn.

And this is where pre-rendered and digitized graphics would shine. The high resolution source images could be converted to sprites of any size and palette, and all that was left was the game programming to manipulate them.

And suddenly the real reason for developers stubbornly sticking with these ugly methods becomes clear.

Problems, We Got Problems

In hindsight it seems clear that both pre-rendered and digitized graphics were flashy ideas that didn't deliver significant value to the player. They were ugly, didn't animate as well (but did animate *more*).

Both digitized and pre-rendered sprites are created against a background of one colour or another. It might be black or white or green, but that colour will forever be an inconsistent outline surrounding the sprite, unless it's carefully trimmed. How well a developer minimized fringing is a good indicator of their skill.

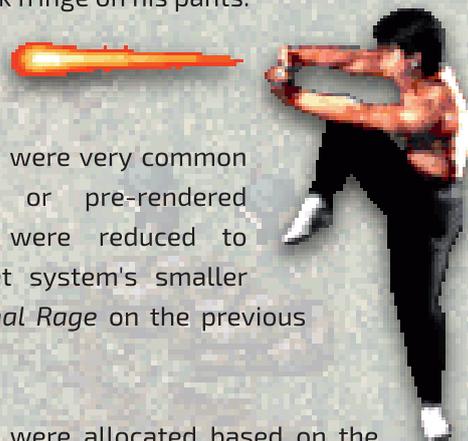
By this measure, the developers of *Rise of the Robots* were not very skilled. Dark backgrounds hid the fringing, but light backgrounds revealed them.

Midway worked out the fringing problem early, and tried to compensate by using rim lights on their models.

Background: Twin Eagle (arcade) used some digitized backgrounds of questionable quality, attempting to add realism to their otherwise excellent helicopter shooter.



This created a highlight, instead of a shadow, which made it easier to eliminate fringing. Except when it didn't. Liu Kang, right, has a rim light across his back, but still has a dark fringe on his pants.



Palette problems were very common when digitized or pre-rendered source images were reduced to match the target system's smaller palette, like *Primal Rage* on the previous page.

Typically colours were allocated based on the number of pixels that required them, so if 90% of the image needed red shades then the remaining 10% lost out. Usually this resulted in faces lacking detail, and *Donkey Kong's frickin' eye*.

Because of the number of images being reduced this way very little attention was paid to the final product. A pixel artist might have used a number of techniques to improve the appearance of the final sprite, but computer algorithms weren't so clever. Colours would often clump together, and there are pixels with completely logical averaged colours that any human could see were out of place..

One way this was reduced was by creating black and white sprites, and adding the colour later. *Clay Fighter* (above) used this technique, and *Donkey Kong Country's* Rambi might have... Or perhaps his pink bits were given the wrong priority. Why is there a grey pixel on his tongue, and a pink pixel on his foot?

It now seems the age of digitized and pre-rendered sprites is over, mostly. They were always a temporary thing, a way to make the old 2D hardware look more capable than it was, to make the graphics look real and shiny until the polygon machines arrived and could create realism on the fly.

They won't be missed.



Despite all the evidence, developers kept on using digitized and pre-rendered sprites. Here are six sequels blighted by these hideous techniques.



When Blizzard released Blackthorne on Sega's 32X they gave it a pre-rendered makeover. It's a little less detailed than the SuperNES sprites, and the 3D models used are comic-book disproportioned.



If ever proof was needed that pixel'd sprites were more awesome than bad actors in silly costumes, *Shinobi Legions* provided it. Every part of this game was less impressive than the pixel games that preceded it.



Yoshi, the pixelly protagonist from one of the finest video games ever made, was given the pre-rendered treatment for the Nintendo 64 sequel. It was made from pre-rendered body parts rather than whole-body sprites, and animated very well. The new *Yoshi's Story* did not sell as well as the first *Yoshi's Island*, moving about 75% fewer copies.



For reasons we can only guess at, Capcom made a digitized game, *Street Fighter: The Movie*, featuring Hollywood actors on loan from the *Street Fighter* movie set. No matter what you think of Kylie Minogue, she's no Cammy.



Cave's sequel to *DoDonpachi* was pre-rendered. The new ship isn't even symmetrical, with stray pixels on both sides.



Cho Aniki was a cheerfully deranged shooter on the PC Engine, with exceptionally good (but batshit-insane) pixel graphics. The Playstation sequel was made from digitized images and... Ye gods. No. Just no.